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Task 1 • How many cupcakes?

**TASK 1**

**(Y4)**

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| To read the most recent version of this task, download associated resources, and view embedded professional learning including classroom videos and work samples, visit: [https://resolve.edu.au/teaching-sequences/year-4/multiplication-trays-arrays/task-1-how-many-cupcakes](https://resolve.edu.au/teaching-sequences/year-4/multiplication-trays-arrays/task-1-how-many-cupcakes?utm_source=docx&utm_medium=task_1&utm_campaign=trays_arrays) |

# Task overview

Students learn that an array can be partitioned into smaller arrays to help work how many there are altogether.

## Learning Goals

An array can be partitioned to form smaller arrays. Adding the products of the smaller arrays gives the total in the original array.

## Resources

**Whole class**:

* Tray of Arrays PowerPoint

**Each group**:

* Cupcake array picture
* Blank A3 paper

**Each student**:

* Zachary and Maddie’s strategies Student sheet
* Isabella and Archie’s Student sheet

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| Task phase | Estimated time | Task type |
| **Launch | How many cupcakes?** | 10 minutes | Whole class |
| **Explore | Calculating cupcakes** | 25 minutes | Small group |
| **Explore | Gallery walk** | 15 minutes | Individual |
| **Connect | Comparing strategies** | 30 minutes | Small group |
| **Connect | Class discussion** | 15 minutes | Whole class |
| **Summarise | Arrays can be partitioned** | 5 minutes | Whole class |

# Teach this task

## Launch | How many cupcakes?

Use **Trays of arrays PowerPoint** to introduce the context of the reSolve Bakery. Show students the illustration on slide 4.

**Discuss**: *What multiplication do you see? Some examples of multiplication represented in the picture include the arrays of cupcakes and bread rolls in the cabinet, and the bags of bread rolls sitting on the counter.*

Show the picture of the cupcake array on slide 5.

*Each day, six different flavours of cupcakes are made in the reSolve Bakery.*

**Pose the task***: How many cupcakes are there altogether?*

## Explore | Calculating cupcakes

Ask students to work in pairs to solve the problem. Provide each pair with **Cupcake array picture** and a sheet of A3 paper. Ask students to use the A3 paper to create a poster of their solution method.

### Questioning to prompt students’ thinking

This task serves as a helpful pre-assessment task. The strategies that students use indicate their existing understandings of multiplication. Pose questions or prompts that help you to make sense of student thinking, for example:

* *Explain your strategy to me.*
* *Why have you partitioned the numbers in that way?*
* *You have created smaller arrays from the larger array. Will the total number of cakes in all the smaller arrays be the same as the total number of cakes in the large array? How do you know?*

### Noticing students’ thinking

Students will use a range of strategies to determine the total number of cupcakes. The purpose at this early stage in the sequence is not to point students to using a particular strategy but rather to take note of the strategy and what this indicates about students’ thinking and understanding.

**Consider:**

* Do students use additive or multiplicative thinking to solve the problem?
* Do students use of strategies demonstrate an understanding of the multiplicative properties of associativity or distributivity?

Watch the **Distributive and associative properties of multiplication** professional learning video embedded in this step to learn more about strategies that use these properties.

## Explore | Gallery walk

Display students’ work around the classroom in preparation for a gallery walk.

Review the original task that students were asked to solve and ask students to think about what they expect to see as they complete the gallery walk.

Ask students to consider the following questions as they look at others’ work:

* *Look at how other students have solved the problems. What do you notice?*
* *Which strategies were particularly helpful for working out the total number of cupcakes? Why?*

Conduct the class gallery walk.

At the end of the class gallery walk, allow students time to read and reflect on any post-it notes left on their work. They may choose to adjust or change to their solution strategies and/or recording methods.

## Connect | Comparing strategies

Provide students with **Zachary and Maddie’s strategies Student sheet**. Explain that these two students solved the problem in different yet similar ways.

**Ask:** *How are these strategies similar and how are they different?*

Allow students time to explore the similarities and differences. Have students record their noticings on their student sheet.

Provide students with **Isabella and Archie’s strategies Student sheet**. Explain that these two students also solved the problem in different yet similar ways.

**Ask:** *How are these strategies similar and how are they different?*

Allow students time to explore the similarities and differences. Have students record their noticings on their student sheet.

Connect | Class discussion

Use the **Trays of arrays PowerPoint** to support the discussion. Share Zachary and Maddie’s strategy on slide 6.

**Discuss:**

* *How are these strategies different?* 
  + Zachary doubles 15 and Maddie adds 15 three times.
* *How are these strategies similar?*
  + Both strategies partition the array into groups of 15 and these groups of 15 are then added together.

Share Isabella and Archie’s strategy on slide 7.

**Discuss:**

* *How are these strategies different?* 
  + Isabella partitions each small cupcake array of 15 into a group of 10 and a group of 5, making 6 groups of 10 and 6 groups of 5.
  + Archie partitions the full cupcake array into a 6 x 10 array and a 5 x 6 array.
* *How are these strategies similar?*
  + Both strategies can be solved using the expression (6 x 10) + (6 x 5).

Look at Strategies 1-4 as a group on slide 8.

**Discuss:**

* *What is similar about each of these strategies?*
  + In each case, the larger array has been fully partitioned to form smaller arrays based on known multiplication facts. All the partial products formed are then added together to find the total in the whole collection.

## Summarise | Arrays can be partitioned

Ask the students to consider whether the strategy that they used was most similar to Zachary, Maddie, Isabella, or Archie’s strategy. Discuss how in each instance, what was known was used to work out what was unknown.

**Explain**: *We can calculate the total number of objects in an array by partitioning the large array into smaller arrays. The total number of objects in the smaller arrays are then added together to find the total number of objects in the large array.*

As a class, look at some of the ways that students partitioned the larger array to create smaller arrays using known multiplication facts.

Create a class display using the students' posters, using the summary statement from above as a title for the display. Read the **Class display** professional learning embedded in this step to learn how this display can be used to build a shared understanding amongst the students.

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**(Y4)**

Task 2 • How many bread rolls?

**Task 2**

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**Task overview**

Students learn that factors can be partitioned and distributed to make partial products in multiplication.

**Learning Goals**

In multiplication, factors can be partitioned and distributed to make partial products. Partitioning factors to create well-known multiplication facts, such as multiples of ten, is particularly helpful. The partial products are then added together to find the product of the original multiplication. This property is known as the distributive property of multiplication.

**Resources**

**Whole class**:

* Tray of Arrays PowerPoint

**Each group:**

* Blank A3 paper
* Bread roll array picture, printed on A4 paper and cut in half

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| **Task phase** | **Estimated time** | **Task type** |
| **Launch | How many bread rolls?** | 5 minutes | Whole class |
| **Explore | Calculating bread rolls** | 25 minutes | Small group |
| **Connect | Whole class discussion** | 15 minutes | Whole class |
| **Summarise | Using place value and known facts** | 5 minutes | Whole class |

**Teach this task**

**Launch | How many bread rolls?**

Use Trays of arrays PowerPoint to continue the story of the reSolve Bakery. Show students the illustration on slide 10.

**Revise the previous task**: *We can calculate the total number of objects in an array by partitioning the large array into smaller arrays. The total number of objects in the smaller arrays are then added together to find the total number of objects in the large array*.

Show the picture of the bread roll array on slide 11.

*Each day, four different types of bread rolls are made in the reSolve Bakery.*

**Pose the task:** *How might you partition the larger array into smaller arrays to determine how many bread rolls there are altogether?*

**Explore | Calculating bread rolls**

Provide each pair with a sheet of A3 paper to create a poster of their solutions strategies. Also provide access to **Bread roll array picture** to use if they choose.

Encourage students to think of different ways they might partition the large array of bread rolls into smaller arrays. Students should record the different solutions that they come up with on their poster, along with the following information:

* At least two different ways that the large array can be partitioned into smaller arrays.
* Which partitioning method is their preferred strategy for working out the total in the collection and why.

### Noticing students’ thinking

Take note of the ways that students are partitioning the larger array.

* Are the students partitioning the smaller arrays of bread rolls or are they looking at the larger array of rolls? Prompt students to think about how they might partition the large array.
* Are students identifying known multiplication facts and partitioning the array based on these facts? Prompt students to consider the multiplication facts that they know well and how they might use these facts to help them find out how many bread rolls there are altogether.

Also observe whether students apply their understanding from Task 1 to this task.

Do students partition the full array and add together all the partial products formed to find the total?

### **Questioning to prompt students’ thinking**

* *What multiplication facts do you know? Which ones can be found by partitioning the larger array?*
  + Students can use any multiplication facts based on multiples of 1, 2, 3 and 4.
* *Which multiplication facts cannot be found by partitioning the larger array?*
  + It is not possible to create facts like 5 x 10 or 10 x 10 just by partitioning the larger array. The arrays would need to be partitioned and then rearranged.
* *Which is your preferred way of partitioning the array to find the total number of bread rolls?*
  + Students’ answers should be focused on finding arrays of well-known facts in the larger array. Partitioning numbers based on place value is very efficient.

**Connect | Whole class discussion**

Select some students to share the strategies they used to calculate the total number of bread rolls in the array. Model students’ strategies using an open array (area model) and record as an equation. The **Model students' strategies** professional learning embedded in this step illustrates how you might do this.

**Discuss:**

*How are the strategies used different, and how are they similar?*

* Difference is seen in the way the array has been partitioned. Similarity is seen in the fact that the array is partitioned. This points to the multiplicative property of distributivity.

*Which way of partitioning the array was most helpful in calculating the total number of bread rolls?*

* + We need to consider the factors (that is, the numbers being multiplied) in the problem to decide which ways of partitioning are most helpful.
  + Multiplication by whole tens is efficient and is also foundational to using the formal multiplication algorithm in later years. As the bread rolls are in smaller 4 x 6 arrays it is not immediately obvious that you can partition based on ten. Students should see that partitioning the array based on the place value parts of numbers is a helpful strategy.

**Summarise | Using place value and known facts**

**Explain:** *We can solve a difficult multiplication problem by partitioning factors to create smaller problems. Partitioning factors to create well-known multiplication facts, such as multiples of ten, is particularly helpful. The products of these smaller problems are then added together to find the product of the original problem.*

Discuss with students the different ways that they partitioned the factors to create known multiplication facts, such as multiples of ten, to solve the problem.

Add to the class display using the students' posters from this task, using the summary statement from above as a title for the display. Read the Class display professional learning embedded in this step to learn how this display can be used to build a shared understanding amongst the students.

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**(Y4)**

Task 3 • How can I work it out?

**Task 3**

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**Task overview**

Students build their understanding of the distributive property.

**Learning Goals**

In multiplication, numbers can be partitioned and distributed to make partial products. Partitioning numbers to create known multiplication facts, such as multiples of ten, is particularly helpful. The partial products are then added together to find the original total of the multiplication. This is the distributive property of multiplication.

**Resources**

**Whole class**:

* Tray of Arrays PowerPoint

**Each group**:

* Small collections of counters

**Each student**:

* How can I work it out? Student sheet
* At least 1 sheet of grid paper
* Post-it notes for use in the gallery walk

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| **Task phase** | **Estimated time** | **Task type** |
| **Build | Number string** | 20 minutes | Whole class |
| **Build | How can I work it out?** | 30 minutes | Whole class and individual |
| **Build | Gallery walk and discussion** | 30 minutes | Whole class and individual |

**Teach this task**

**Build | Number string**

Complete the number strings below as a class. We suggest completing the string on two separate days (see the Suggested Implementation for this sequence). Watch the **Number strings** professional learning embedded in this step to learn how to run a number string with your class.

The first number string is on slide 13 and the second is on slide 14.

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| **Number string 1** | **Number string 2** |
| 2 x 6  5 x 6  7 x 6  10 x 6  17 x 6  27 x 6  6 x 52 | 9 x 10  9 x 9  9 x 11  9 x 3  9 x 13  9 x 15 |

**Build | How can I work it out?**

**Revise**: *We have learnt that we can solve a difficult multiplication problem by partitioning factors to create smaller problems. Partitioning factors to create well-known multiplication facts, such as multiples of ten, is particularly helpful. The products of these smaller problems are then added together to find the product of the original problem.*

Show students slide 15 in the **Trays of arrays PowerPoint.**

**Pose the activity**: *These students know how to multiply by 2, 3, 5, and 10. Can you show them how they can use what they do know to work out what they don’t know?*

Provide students with **How can I work it out? Student sheet**. Allow them time to work through the activity.

Ask students to present their different solutions as array. They may choose to use grid paper or counters to do this.

**Build | Gallery walk and discussion**

Conduct a gallery walk so that students can look at the different solutions that other students have used. Ask students to consider the following questions in the gallery walk:

* *Look at how other students have solved the problems. What do you notice?*
* *Are there strategies that are different to the strategy that you used? Which strategies were particularly helpful for working out the different problems? Why?*

Conduct a class discussion to look at the different solutions that the students used to solve the different multiplication problems.

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**(Y4)**

Task 4 • Packing rolls

**Task 4**

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**Task overview**

Students learn that when multiplying two numbers, halving one number and doubling the other does not change the product.

**Learning Goals**

When multiplying two numbers, if we halve one number and double the other the total remains the same. Equivalence in multiplication is maintained no matter how the numbers are grouped.

**Resources**

**Whole class**:

* Tray of Arrays PowerPoint

**Each group**:

* Blank A3 paper
* Trays of bread rolls picture, printed on A4 and cut in half

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| **Task phase** | **Estimated time** | **Task type** |
| **Launch | Bags of six** | 5 minutes | Whole class |
| **Explore | How many bags?** | 25 minutes | Small group |
| **Connect | Looking at relationships** | 15 minutes | Whole class |
| **Summarise | Halve and double** | 5 minutes | Whole class |

**Teach this task**

**Launch | Bags of six**

Use **Trays of arrays PowerPoint** to continue the context of the reSolve Bakery. Show students the illustration on slide 17.

**Revise:** *We have learnt that we can solve a difficult multiplication problem by partitioning factors to create smaller problems. Partitioning factors to create well-known multiplication facts, such as multiples of ten, is particularly helpful. The products of these smaller problems are then added together to find the product of the original problem.*

Show the picture of the baker and the bread rolls on slide 18.

*The baker bakes five trays of bread rolls each day. There are a dozen bread rolls on each tray. The baker then packs all these rolls into bags. Each bag has exactly six bread rolls.*

Show the picture of the second bread roll array on slide 19.

**Pose the task**: *How many bags of six bread rolls will there be?*

**Explore | How many bags?**

Provide each pair with a sheet of A3 paper and access to **Trays of bread rolls picture t**o use if they choose.

Allow students time to investigate the problem and to present their solution as a poster on the A3 paper.

### Noticing students’ thinking

How do students divide the bread rolls into bags of six? Do students:

* **Share by ones**: Prompt students to think about how they could efficiently make groups of six.
* **Create groups of six without using an array**: Ask students:
  + *Are you confident that there are six in each array?*
  + *How could you arrange the groups so that you know there are six at a glance?*
* **Partition the array of 12 into two arrays of six**: Encourage students to think about how they might describe their strategy in words or record it as an equation.

Do students notice the relationship between the number of bread rolls on one tray and the number of bread rolls in one bag? Don’t draw their attention to this at this stage of the task—it will be the focus of the Connect phase. If students do comment on this relationship, ask them to consider why it exists.

**Connect | Looking at relationships**

Invite some students to share their solutions with the class. Consider how the different strategies are different and how they are similar.

Record the solution to the problem on the board in the following way:

**5 trays of 12**

**10 bags of 6**

**Discuss**:

* *What relationships do you notice?* 
  + The number of bags is double the number of trays and the number of rolls in a bag are half the number of rolls that are on a tray.
* *Why do these relationships exist?*
  + The bread rolls on one tray are packed into two bags. To do this, we halve the large array of 12 rolls on one tray into two smaller groups of six. This means we need twice the number of bags as trays.

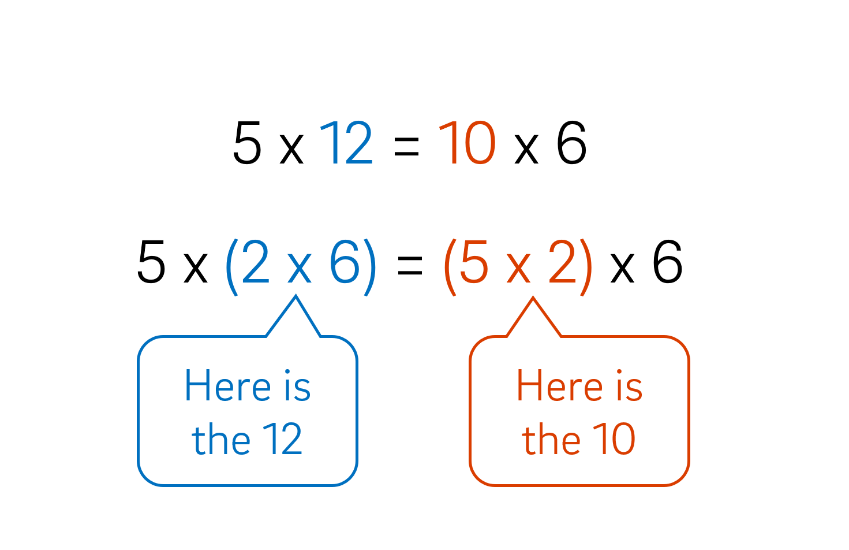
Explain to students that we can make sense of this relationship using the array and numbers. Show students **Trays of arrays PowerPoint** slides 20 and 21. These slides illustrate how the associative property applies to this task.

Discuss how the array helps to make sense of these relationships and that equivalence in multiplication is maintained no matter how the numbers are grouped.

**Summarise | Halve and double**

Use **Trays of arrays PowerPoint** slide 21 to review the learning from this task.

**Review**: *To find out how many bags of bread rolls there will be, we halved 12 to make 2 groups of 6, which we represented as 2 x 6. We had 5 trays and there were enough rolls on each tray to pack 2 bags of 6 bread rolls. So, to find the number of bags, we multiplied 5 by 2 to make 10, which we represented as 5 x 2.*



*On one side of the equation the 2 was grouped with the 6 and on the other side the 2 was grouped with the 5.*

**Explain**: *Equivalence in multiplication is maintained no matter how the numbers are grouped. This helps us understand why halving one number in a multiplication means we need to double the other number to ensure the total remains the same.*

Add to the class display using the students' posters from this task, using the summary statement from above as a title for the display. Read the **Class display** professional learning embedded in this step to learn how this display can be used to build a shared understanding amongst the students.

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Task 5 • Packing cakes

**Task 5**

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**Task overview**

Students learn that when multiplying a set of numbers, the product is the same no matter how the numbers are grouped.

**Learning Goals**

When multiplying two numbers, if we divide one number by four and multiply the other number by four the product remains the same. Equivalence in multiplication is maintained no matter how the numbers are grouped.

**Resources**

**Whole class**:

* Tray of Arrays PowerPoint

**Each group**:

* Trays of cupcakes picture, printed on A4 and cut in half
* Blank A3 paper

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| **Task phase** | **Estimated time** | **Task type** |
| **Launch | Boxes of six** | 5 minutes | Whole class |
| **Explore |** **How many boxes?** | 25 minutes | Small group |
| **Connect |** **Looking at relationships** | 15 minutes | Whole class |
| **Summarise | Grouping differently** | 5 minutes | Whole class |

**Teach this task**

**Launch | Boxes of six**

Use **Trays of arrays PowerPoint** to continue the context of the reSolve Bakery. Show students the illustration of the bread rolls on slide 23.

**Revise:** *Halving one number and doubling the other number in a multiplication problem maintains equivalence.*

Show the picture of the baker and cakes on slide 24.

*The baker bakes three trays of cupcakes each day which are packed into boxes. There are two dozen cupcakes on each tray. These cupcakes need to be packed into boxes of six cupcakes ready to sell.*

*The baker remembers that when he was packing the bread rolls, he needed twice the number of bags as there were trays. “I have three trays of cakes so I will need six boxes to pack all the cakes”.*

Show the picture of the second cupcake array on slide 25.

**Pose the task:** *Does the baker have the right number of boxes to pack all the cakes?*

**Explore | How many boxes?**

Provide each pair with a sheet of A3 paper and access to **Trays of cupcakes picture** to use if they choose.

Allow students time to investigate the problem and to present their solution as a poster on the A3 paper.

Through the investigation, students will realise that six boxes will not be enough to pack all the cakes. Ask them to work out how many boxes the baker will need to pack all the cakes into boxes of six.

### Noticing students’ thinking

How do students divide the cakes into boxes of six? Do students:

* **Share by ones**: Prompt students to consider what they learnt from the previous task to help them complete this task.
* **Create groups of six**: When students have made the groups of six, remind them of the previous task and the relationships that were evident. Ask them to look at the numbers in this problem and consider if there are similar relationships that exist.
* **Use the relationships between the numbers**: Ask the students to record the relationships that they see using words and/or numbers, and to explain why these relationships exist.

### Questioning to prompt students’ thinking

* *Why is it not twice as many boxes as trays this time?*
  + There are 24 cakes on each tray which means that there are enough cakes on each tray to pack six full boxes.
* *What is the relationship between the numbers in the problem? Why does this relationship exist?*
  + This time four boxes of six can be made from one tray of cakes. That means we will need four times as many boxes as trays. The relationship is a multiplicative one: by dividing 24 into four groups of six, you need to multiply the number of trays by four to determine the total number of boxes needed.
* *How many boxes of six cakes will you be able to make from four trays of 18? Can you work out a way to quickly calculate a solution to the problem?*
  + This question prompts the students to think more deeply about the multiplicative relationship between the numbers and how this relationship can be used to calculate the number of boxes needed.
  + 18 can be divided into three groups of six. You need to multiply four (the number of trays) by three to determine the total number of boxes needed.

**Connect | Looking at relationships**

Invite some students to share their solutions with the class. Consider how the different strategies are different and how they are similar.

Record the solution to the problem on the board in the following way:

**3 trays of 24**

**12 boxes of 6**

**Discuss**:

* *What relationships do you notice?* 
  + The number of boxes is four times the number of trays, and the number of cakes in a box is a quarter of the number on a tray.
* *Why do these relationships exist?*
  + The cakes on one tray are packed into four boxes. Each tray of cakes is divided into four smaller groups of six. This means we need four times the number of boxes as trays.

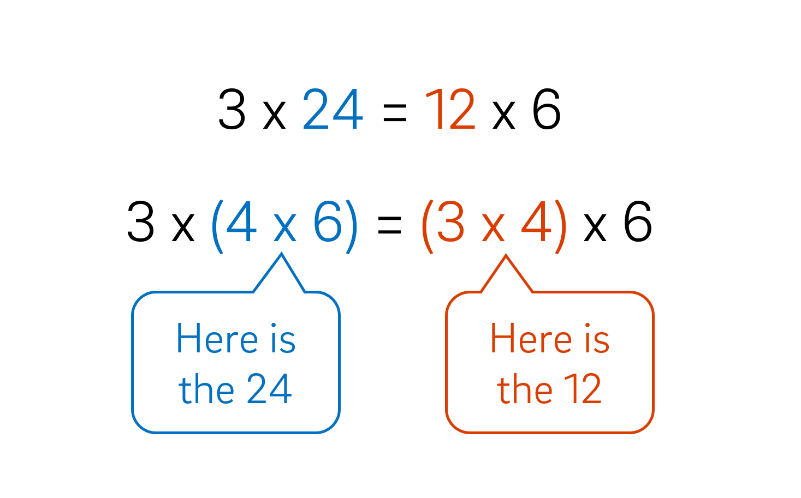
Explain to students that we can make sense of this relationship using the array and numbers. Show students **Trays of arrays PowerPoint** slides 26 and 27. These slides illustrate how the associative property applies to this task.

Discuss how the array helps to make sense of these relationships and that equivalence in multiplication is maintained no matter how the numbers are grouped.

**Summarise | Grouping differently**

Use **Trays of arrays PowerPoint** slide 27 to review the learning from this task.

**Review:** *To find how many boxes of cakes there would be we divided the 24 into four groups of six, which we represented as 4 x 6. We had three trays and there were enough cakes on each tray to pack four boxes with six cakes. So, to find the number of boxes there would be we multiplied three by four to make 12, which we represented as 3 x 4.*



On one side of the equation the 4 was grouped with the 6 and on the other side the 4 was grouped with the 3.

**Explain:** *Equivalence in multiplication is maintained no matter how the numbers are grouped. This helps us understand why, when we multiply two numbers, we can divide one number by four and multiply the other number by four to ensure the total remains the same.*

Add to the class display using the students' posters from this task, using the summary statement from above as a title for the display. Read the **Class display** professional learning embedded in this step to learn how this display can be used to build a shared understanding amongst the students.

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**(Y4)**

Task 6 • Transforming arrays

**Task 6**

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| To read the most recent version of this task, download associated resources, and view embedded professional learning including classroom videos and work samples, visit: [https://resolve.edu.au/teaching-sequences/year-4/multiplication-trays-arrays/task-6-transforming-arrays](https://resolve.edu.au/teaching-sequences/year-4/multiplication-trays-arrays/task-6-transforming-arrays?utm_source=docx&utm_medium=task_6&utm_campaign=trays_arrays) |

**Task overview**

Students complete an activity with arrays to build their understanding of the associative property.

**Learning Goals**

Students complete an activity with arrays to build their understanding of the associative property.

**Resources**

**Whole class**:

* Tray of Arrays PowerPoint

**Each group**:

* A small collection of counters

**Each student**:

* Transforming arrays Student sheet

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| **Task phase** | **Estimated time** | **Task type** |
| **Build | Number string** | 20 minutes | Whole class |
| **Build | Transforming arrays** | 30 minutes | Small group |

**Teach this task**

**Build | Number string**

Complete the number strings below as a class. We suggest completing the string on two separate days (see the Suggested Implementation for this sequence). Watch the **Number strings** professional learning embedded in this step to learn how to run a number string with your class.

The first number string is on slide 29 and the second is on slide 30.

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| **Number string 1** | **Number string 2** |
| 3 x 4 =  6 x 4 =  3 x 8 =  6 x 8 =  12 x 4 =  3 x 16 = | 2 x 6  2 x 2 x 3  4 x 3  6 x 5  2 x 3 x 5  2 x 15 |

**Build | Transforming arrays**

Use **Trays of arrays PowerPoint** to review the learning from the previous two tasks.

Show slide 31.

*To find how many bags of bread rolls there would be we divided 12 into 2 groups by representing it as 2 x 6. We doubled 5 to make 10 by grouping the 2 and 5.*

Show slide 32.

*To find how many boxes of cakes there would be we divided 24 into 4 groups by representing it as 4 x 6. We quadrupled 3 to make 12 by grouping the 3 and 4.*

**Pose the activity***: Illustrate why these equations are equivalent. You can use arrays and/or numbers.*

Provide students with **Transforming arrays Student sheet** and a sheet of grid paper to create arrays. Also provide students access to counters if they would prefer to represent their arrays in this way. Allow students time to work through the activity.

Conduct a class discussion to look at the arrays and numbers that they used to illustrate the equivalence between equations.

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**(Y4)**

Task 7 • Card sort

**Task 7**

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| To read the most recent version of this task, download associated resources, and view embedded professional learning including classroom videos and work samples, visit: [https://resolve.edu.au/teaching-sequences/year-4/multiplication-trays-arrays/task-7-card-sort](https://resolve.edu.au/teaching-sequences/year-4/multiplication-trays-arrays/task-7-card-sort?utm_source=docx&utm_medium=task_7&utm_campaign=trays_arrays) |

**Task overview**

Students complete a card sort activity to consolidate their understanding of the distributive and associative properties of multiplication.

**Learning Goals**

In multiplication, factors can be partitioned and distributed to make partial products. The partial products are then added together to find the product of the original multiplication (distributive property).

When multiplying a set of numbers, the product is the same no matter how the numbers are grouped.

**Resources**

**Whole class**:

* Tray of Arrays PowerPoint

**Each group**:

* Set of Card Sort cards, printed on A4 and then cut out
* Template for students to make their own Card Sort

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| **Task phase** | **Estimated time** | **Task type** |
| **Build | Card sort** | 30 minutes | Group and whole class |
| **Build | Make your own** | 20 minutes | Small group |

**Teach this task**

**Build | Card sort**

Use **Trays of arrays PowerPoint** to review the learning so far in this sequence.

Show slide 35.

**Revise**: *We can solve a difficult multiplication problem by partitioning factors to create smaller problems. The products of these smaller problems are then added together to find the find the product of the original problem.*

Show slide 36.

**Revise**: *We also learnt that when multiplying a set of numbers, the product is the same no matter how the numbers are grouped. This helps us understand why, when multiplying two numbers, halving one number means we need to double the other number to ensure the total remains the same. Or dividing one number by four and multiplying the other number by four to ensure the product remains the same.*

Explain to students that they will be matching equations with corresponding array representations and that the learning just revised will help the students complete the task.

Provide pairs of students with a **Set of Card Sort cards** and ask them to create matching pairs of equations and arrays.

Allow time for students to complete the activity, then bring students together for a whole class discussion. Show slide 37 from **Trays of arrays PowerPoint**.

**Discuss:** *In the card sort, 7 x 8 was solved three different ways. Which strategy would you use? Why? The focus here is on which strategies are most efficient. For example, students may reason that (5 x 8) + (2 x 8) is an easier calculation to perform as compared to 7 x 2 x 2 x 2 or (7 x 5) + (7 x 3), as the answer to 5 x 8 is a whole ten, which makes it easy to add on the 2 x 8.*

Ask students to review each question in their **Set of Card Sort cards** and decide which strategy they think is the most efficient.

**Build | Make your own**

Ask students to create their own card sort activity using the following instructions. These instructions are on slide 38 of the **Trays of arrays PowerPoint**.

1. Start by selecting a multiplication problem.
2. Think of at least three different ways that the multiplication problem can be solved.
3. Represent the different solution methods as an array and as an equation.
4. Create a card for each array and for each equation.

Have students swap their card sort activity with another person/group and ask them to solve it.

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| To read the most recent version of this task, download associated resources, and view embedded professional learning including classroom videos and work samples, visit: [https://resolve.edu.au/teaching-sequences/year-4/multiplication-trays-arrays/task-7-card-sort](https://resolve.edu.au/teaching-sequences/year-4/multiplication-trays-arrays/task-7-card-sort?utm_source=docx&utm_medium=task_7&utm_campaign=trays_arrays) |