

Sample Lesson Structure 25 – Multiplication



Y4

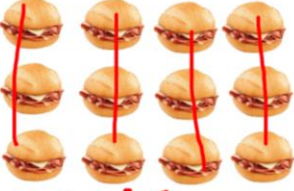
Objective: To develop informal insights into multiplication (two digit \times by one digit) and gradually refine these (arrays, open array, grid method).

Kim is a deli owner. She sells sandwiches, cookies, cupcakes, cakes and croissants. Kim makes and sells sandwiches by the box. This is how she packs a box. How many does each box hold? What different ways to describe twelve?

Boxes				
Sandwiches				

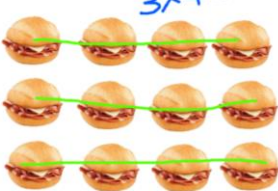
Boxes				
Sandwiches				



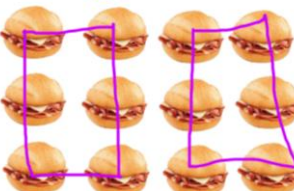
$12 = 3 + 3 + 3 + 3$

Lots of 4
3 groups of 4



$12 = 4 + 4 + 4$

2 lots of 6



$5 + 6 = 12$

An order came in for four boxes of sandwiches from the local school for sports day. Kim wrote the order down on the order form. (Teacher- writes 4 on the form). Kim took out four boxes and then started preparing the order on the counter. This is what it looked like.

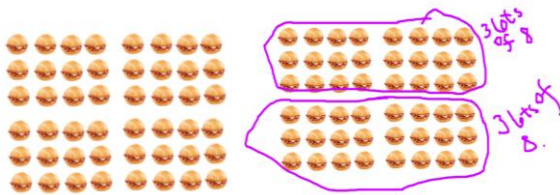
Boxes	1	4		
Sandwiches	12	?		



She said, “Look, 3 lots of 16 is 48.” Explain what she meant?
 “Oh, I can see 4 lots of 12 is 48 also.” Where is this?

What are the other ways to 'see' these sandwiches which would be helpful to find the total efficiently and without counting by ones? TPS Record total number of sandwiches onto order form.

As Kim was making space to pack the boxes, she rearranged the sandwiches like this (on next slide). Her assistant came in and said; "What did you do to the order? I'll have to make more to fill the order!" What do you think? Will she need more? Why? Why not? What should Kim say to explain why the total has remained the same?" "What are the different ways you see the 48?"



She said this is 3 lots of 8 and another 3 lots of 8. Can you explain her thinking? Use markings to record students' thinking.

Using the original image (on following slide) rearrange and ask students to discuss different ways to describe the total. Record different ways of seeing the total

Where would you draw the line to show 3 lots of 12 and 3 lots of 4? TPS

The next day they got an even bigger order for 8 boxes. Kim wrote the order on the order form. Kim noticed something interesting on the order form. "I know exactly how many sandwiches I need to make". What do you think she noticed?

Boxes	1	4	8	
Sandwiches	12	48	?	



Remove the boxes and allow students to explore different ways of calculating 96 sandwiches.

Teacher's note: it is double the previous order- in case students don't see the relationship i.e. teacher introduces under the guise or think aloud...I heard _____ in Ms. Ebanks say it is just double the previous order. I am not sure. Can you help me understand?

Kim's Deli also sells cupcakes. Kim bakes the cupcakes and her assistant, Maggie, displays them in the display case like this each morning. Maggie needs your help to figure out how many cupcakes she has displayed in the showcase today as they just got an order for a birthday party.



How many cupcakes are in the showcase? How can you figure the total without counting by ones? What are the different ways you can "see" the 72 cupcakes. Record students' strategies on the flip chart as with the examples with the sandwiches.

Where do you think is the best place to start calculating?

Teachers Note: Some students may automatically start at the total- watch for those demonstrating grouping. Students could also be given this image in pairs to work on.

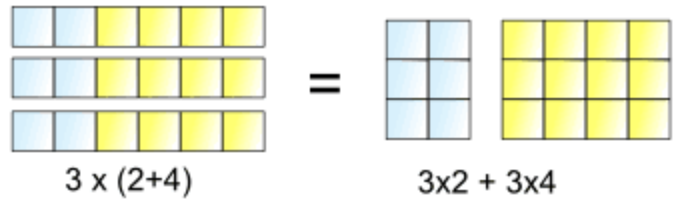
Students may think of a variety of ways but if students do not suggest from 60 then continue the count, you can demonstrate this strategy under the guise of....Jenny started counting the columns to the 10th column and said, "I know that 10 groups of 6 is 60, so I can find the total quickly now." Complete her count. Explain why she said was a quick way to calculate the total number of cupcakes using this strategy. **TPS**

Repeat using images that extend beyond 10 columns. Some have been created for you on the flipchart using patties and crossaints to keep the context of the Deli.

Teacher's Note: Introduction of the open array: After a while drawing all the dots can get very tedious! The open/blank array then becomes a very useful tool for helping children model their thinking and work out how to do more complex multiplications in an informal way. It reinforces the distributive law of multiplication as we are beginning to look at partial products.

The Distributive Law says that multiplying a number by a group of numbers added together is the same as doing each multiplication separately

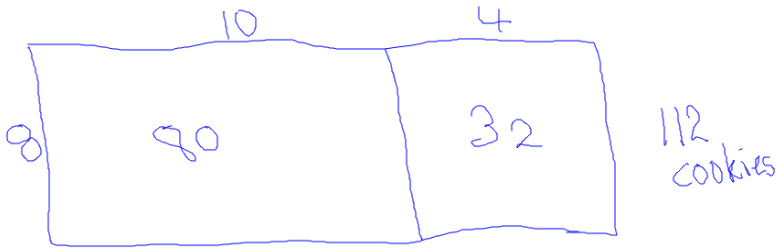
Example: $3 \times (2 + 4) = 3 \times 2 + 3 \times 4$, So the "3" can be "distributed" across the "2+4" into 3 times 2 and 3 times 4.



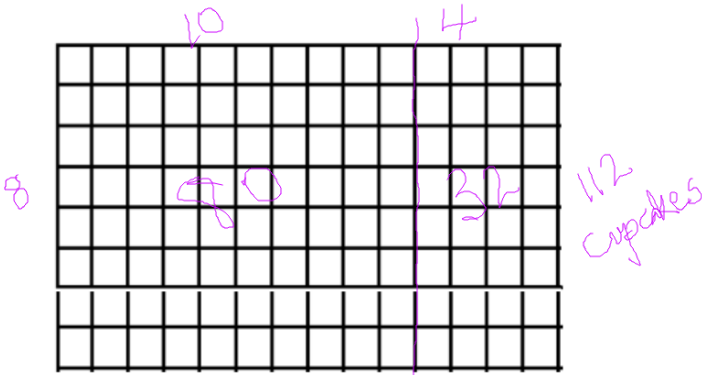
Beyond the open/blank array this 'dividing /Splitting the multiplication into easy parts' strategy can be formalised into the grid method.

Kim sold cookies in boxes of 8. She got an order for 14 boxes of cookies. She asked her assistant, Maggie to figure out how many cookies she needed to bake. Maggie took out her paper and pencil and began drawing out the array of cookies to calculate the total. Kim’s daughter, Jessica, saw them busy at work trying to figure out how many cookies they had to bake by drawing dots in an array.

Jessica said, “I have another way of calculating the total, and I don’t need to draw the cookies.”

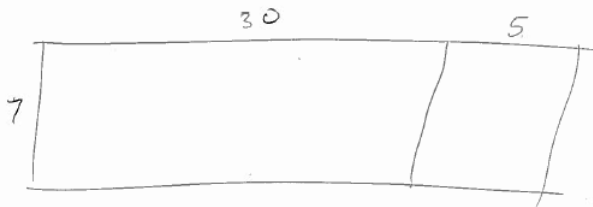
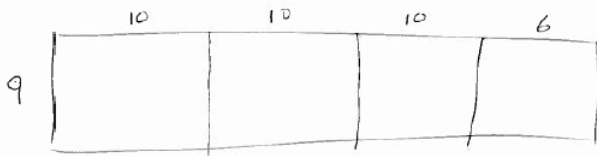
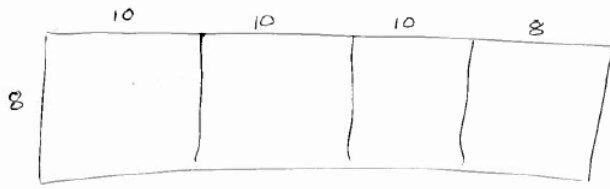


Explain how she got her answer of 112. **TPS** What does the 8 represent? What does the 10 represent? Could Jessica have solved it another way? (If this is not obvious to students/ too abstract show the array and make the markings. Then make connections to open array.)

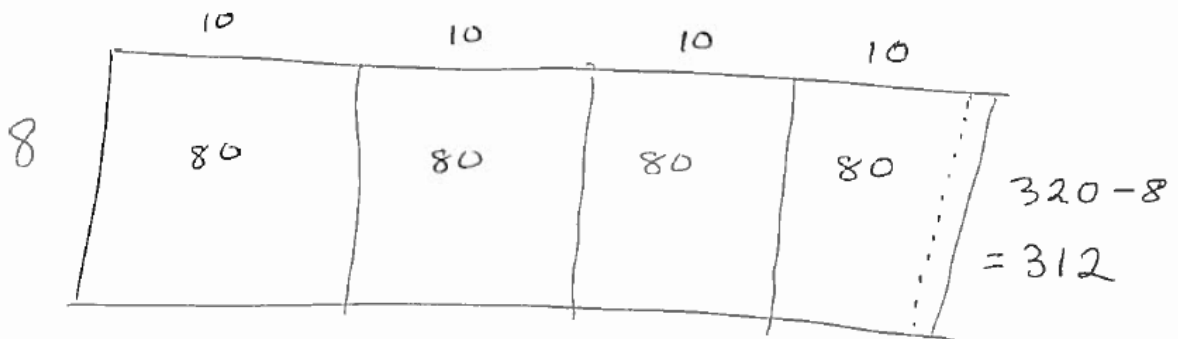


Use Jessica’s strategy to calculate 6 lots of 66; 7 lots of 23; 6x34. *Ensure discussion and explanations are highlighted between different representations- different ways students have split the numbers*

What are the multiplications shown here? In each case work out the answer by filling in amounts and adding totals. If students are struggling you may have to give one example of what this would look like.



Kim thought that Jessica's idea was really interesting, but when she got an order for 39 boxes, Jessica did something really clever (efficient) to work out the number of cookies needed. Explain her thinking.
TPS



Will this always work? (*Depends on the numbers- link to compensation- students may over generalize*)
How can we check to see if this Jessica's strategy will work with other orders?

Repeat with several examples. Allow students to use different representations to show their thinking.

Kim received an order for 18 boxes of cookies. Jessica said all we will have to do is find out how many cookies are in 10 boxes, and another ten boxes but then take 2 boxes out of the each of the order and we will know how many cookies in all. Kim said I am not sure what you mean. Explain to Kim what Jessica said by using a model/drawing. TPS