Student Worksheet 1
TI-30XB MultiView™: Cabinets & Flat Packs

W1

Name:

Mr Lum is a cabinet maker. On his website, he advertises on his web page that he sells kitchen cabinet modules for the home renovator. These cabinet modules are supplied by Lumina Supreme Kitchens as ready to assemble units (called flat packs).

The flat packs, he sells, come in two different widths:

500 mm and 700 mm.
The 500 mm wide module is called the 'size 5 flat pack'.
The 700 mm wide module is called the 'size 7 flat pack'.

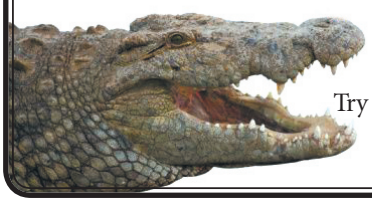
He sells a size 7 flat packs for $237.60 and a size 5 flat packs for $198.80.

Lumina Supreme Kitchens

At Lumina Supreme Kitchens you hold all the aces
You get the best deals
We are the Kings in Kitchens

High quality laser cut flat packs
Modules to exactly fit any size wall
(700 mm and 500 mm modules standard sizes)

Don't delay call NOW on
Email **Lumina_Supreme_cabinets@gmail.com.au**
Phone **(03) 9007 3088**



Try the others but don't get bitten by the opposition compare our **HIGH** quality and **LOW** prices before you buy.

The DIY (Do It Yourself) renovator measures the length of the wall in the kitchen on which the cabinets are to be placed. Then the renovator needs to determine what combination of flat packs needs to be ordered to 'exactly fit the measured wall length'.

In his web page, Mr Lum says you can fit cabinets for any size wall (over 1.2 metres) using his '700 mm (size 7 flat pack) and 500 mm (size 5 flat pack) modules'.

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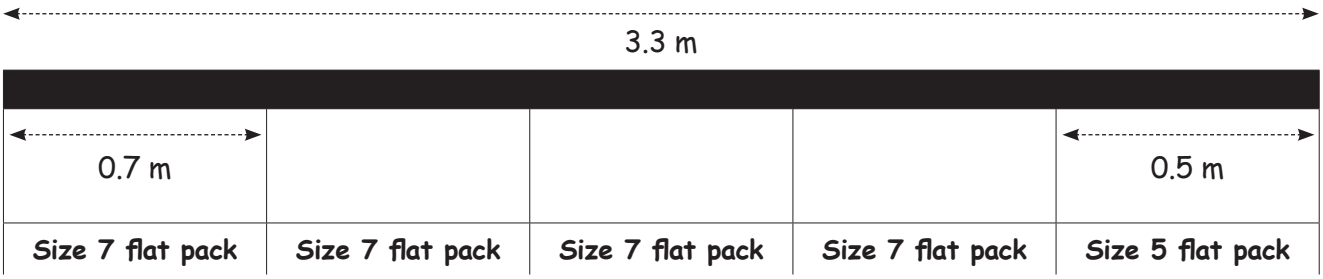
W1

Task 1

Angela buys four 'size 7 flat packs' and one 'size 5 flat pack' to fit across the 3.3 metre wall section. The renovators plan for fitting the flat packs across the wall is below:



a) What is the total cost of the flat packet units for the 3.3 metre length of wall?

b) Initially Angela was going to buy three 'size 5 flat packs' and two 'size 7 flat packs' for the 3.3 metre wall. Could this combination of flat packs fit the wall?

c) If Angela was going to use only 'size 5 flat packs' in her project to put cabinets along a 3.3 metre wall, what is the maximum number of size 5 flat packs she could fit?

d) If Angela was going to use only 'size 7 flat packs' in her project to put cabinets along a 3.3 metre wall, what is the maximum number of size 7 flat packs she could fit?

e) Complete a table showing the different ways Angela could arrange 'size 7 flat packs' and 'size 5 flat packs' across her 3.3 metre length of wall. Each way needs to use as much cabinet space as possible, so Angela will continue to put cabinets along the wall until she can no longer fit a size 7 or size 5 flat pack.

Number of 'size 7 flat packs'	Number of 'size 5 flat packs'	Length of wall with cabinets	Length of wall without cabinets

Task 2

a) How would you buy size 5 and size 7 flat pack modules to best fit a 3200 mm wide wall?

b) Using the prices given for the flat packs modules, what is the total cost of the cabinet units for the 3200 mm wall?

Task 3

a) If the wall is 4200 mm in length, what flat pack modules would you buy to best fit along the wall?

b) Make a table (similar to table in task 1) to discover other ways can you buy a combination of size 5 and size 7 modules to fit the 4200 mm wall length?

c) Using the module prices from Task 1, which is the cheapest arrangement of modules you can buy if you want to cover the 4200 mm wall?

Task 3

a) How many of the size 7 and size 5 modules would you need to fit along a 1800 mm wall length?

b) Use your results from the investigations, write an email to Mr Lum outlining any concerns you have about his advertisement.

THINK SPOT

a) If a length of wall is fitted using five 'size 7 flat packs' and one 'size 5 flat packs', using diagrams show the different ways the cabinets can be placed along the wall.

b) How many different ways could four 'size 7 flat packs' and two 'size 5 flat packs', be placed along the wall.

Student Worksheet 2
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W2

Name:

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In response to customer demand, the Lumina Supreme Kitchen decides to add a new size flat pack to its existing modules. Cabinet modules now come in:

- 400 mm (size 4 flat pack) cost $176.50
- 500 mm (size 5 flat pack) cost $198.80
- 700 mm (size 7 flat pack) cost $237.60

Student Worksheet 2
TI-30XB MultiView™: Cabinets & Flat Packs

W2

Task 1

Choose a partner with whom you can:
Investigate the situation using different flat pack sizes. One partner should investigate which lengths of wall can be filled using combinations of sizes 4 and 5 flat packs, the other should investigate which lengths of wall can be filled using combinations of sizes 5 and 7 flat packs. Together investigate which length of walls can be filled using sizes 4 and 7 flat packs.

For each combination of two sized flat packs answer the following questions:

a) Find which lengths of wall between 1 metre to 4.5 metres can be exactly fitted using two sizes of flat packs.

b) Find the cost of the flat packs for the walls that can be exactly fitted?

c) Compare your two situations. Are there any lengths that one combination of flat packs will fill but the other combination will not fill?

d) Which lengths of wall cannot be exactly fitted by either flat pack combinations?

e) Which lengths of wall are filled using only one size of flat packs?

f) When two different combinations of flat packs (size 4 and 7 flat pack or size 4 and 5 flat packs) exactly fit a length of wall, which combination is cheapest? How much would be saved using the cheaper combinations of flat packs?

Task 2

While repeated guesses may be used to decide which combinations of flat packs can fill a wall length, the flat pack numbers represent factors. As factors, we know that for 'non trivial common' factors, the HCF is usually one, and that one factor is not a multiple of the other factor.

For example, for 4 and 5, the LCM is 20.

When using the addition of multiples of two values to form a number, two mathematical expressions exist which allow you to determine the largest number which cannot be formed using these two numbers. This expression is **x.y – (x + y)**

For example when x = 4 and y = 5, the value of **x.y – (x + y)** = 20 – 9 = 11. This implies that every number after 11 can be written as a combination of the values 4 and 5. For cabinet makers this means that any wall longer than 1.1m can be filled using a combination of 0.4m and 0.5m module units. (Assuming the wall lengths are truncated to the nearest tenth of a metre).

Another expression **0.5(x - 1)(y - 1)** allows the cabinet maker to determine how many wall lengths there are below the value **x.y – (x + y)** where wall can definitely be fitted. For example when x = 4 and 5, there are 0.5(4 – 1) (5 – 1) = 6 lengths of wall below 1.1 metres that cannot be fitted using any combination of 0.4 metre and 0.5 metre modules. These lengths are 0.1m, 0.2m, 0.3m , 0.6m, 0.7m and 1.1 m.

In general the largest wall that cannot be fitted with a 'size x flat pack module' and a 'size y flat pack module' is x.y – (x + y), provided that x and y have no non-trivial common factors.

Longest wall not able to be fitted by packs = x.y – (x + y)

This would mean:
An answer of 16 converts to a 1.6 metre length of cabinets.
A flat pack of size 3 could be used with a flat pack of size 4 but not with a flat pack of size 6, as they have a non trivial factor of 3.

The total number of wall lengths that cannot be fitted is given by the rule.

Number of wall lengths not able to be fitted = 0.5(x - 1)(y - 1)

a) Use the formula to check your answers about how many lengths of walls could not be fitted exactly.

b) Use the formula to check value for the last length of wall that could not be fitted exactly by the combination of flat packs.

Assessment Task
TI-30XB MultiView™: Cabinets & Flat Packs

AT

Name:

Research Activity

Go to a major hardware store, or use the internet to research a firm (e.g. www.flatpax.com.au) which can supply ready made cabinets (flat packs) for kitchens. Search out the standard sizes they can supply and the cost of the material.

Redesign your kitchen at home:

- Measure the lengths of the walls in your kitchen
- Come up with a new or revised kitchen design to the one you have now
- Draw a plan (to scale on graph paper) of the kitchen, showing the arrangements of the flat packs, their sizes and appliances
- Give a list of the material (sizes for the flat packs) and the cost of purchasing the material to re-do your kitchen in the new design