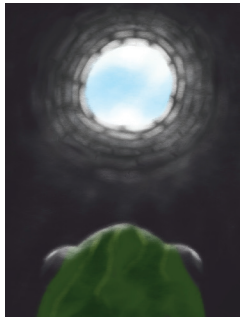
Y8 Learning at home activity sheet #5

Problem 1:

A frog is at the bottom of a well that is 23 metres deep.
Every day it crawls up five metres.
At night it slips down two metres.

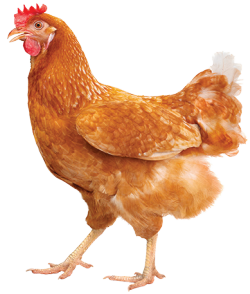
How many days will it take for the frog to escape from the well?



Problem 2:

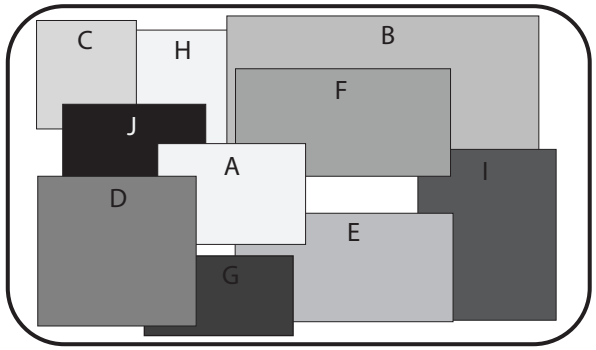
There are only chickens and pigs in the farmyard.
Altogether there are 135 animals and 348 legs.

How many of each animal are there?



Problem 3:

Here is a community notice board.
In which order, first to last, were the notices put up?



Finding common factors:

Your kuia (Grandma) bakes two batches of cookies for your school gala.

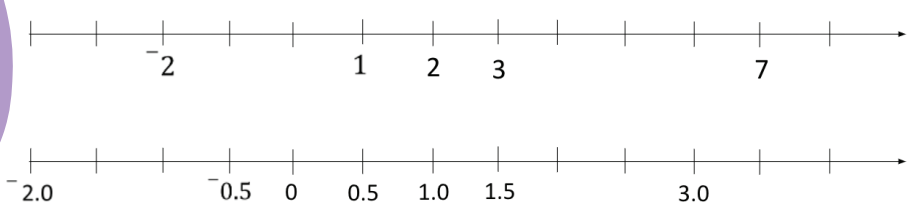
She bakes 72 vanilla cookies and 60 sultana cookies.

She wants to make bags that contain the same number of vanilla and sultana cookies. For example, she could make four bags that contain 18 vanilla cookies and 15 sultana cookies.

What other numbers of equal bags could kuia make with her cookies?

Placing numbers:

Write the missing numbers on these number lines.



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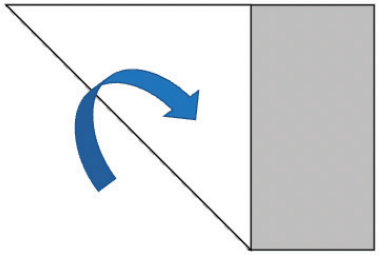
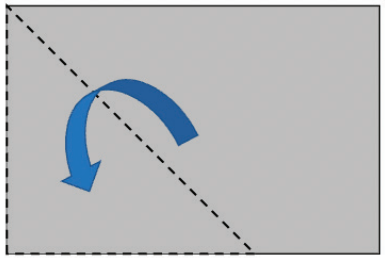
45 degrees:

Follow these steps to make triangle with two angles measuring 45^0.

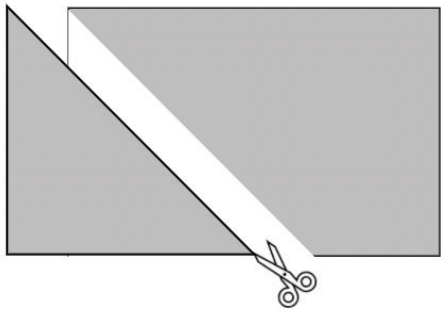
Take a rectangle of paper or card.



Fold the bottom left corner to create a right-angled triangle. Crease the fold.

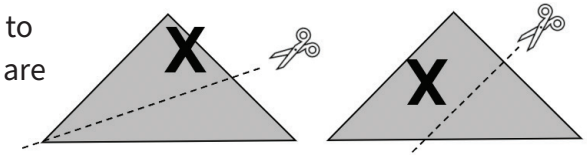


Unfold the triangle.



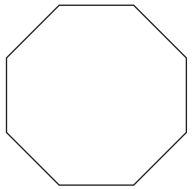
Cut along the fold line to create a triangle with two 45^0 angles.

Where would you cut the triangle to make two identical triangles that are half the area of the orginal?



Use your 45^0 triangle to draw a regular octagon.

Each side and angle must be equal.



A cupful:

Fill a cup with dry material that you can pour. You might use sand, sawdust, dry dirt, rice, or pasta. If you use food do not waste it. Wash it and cook it for your whānau.

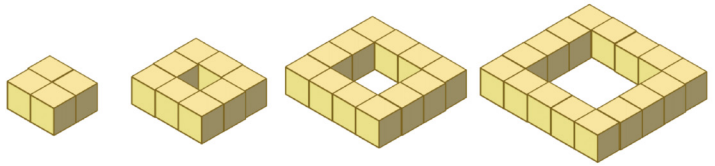
Use scrap cardboard like used packets from the cupboard, scissors, a ruler, and tape.

Make three different boxes that will hold all the contents of the cup (sand, sawdust, rice, etc.).

Can you make the box the right size, so the contents of the cup fill it to the brim?

Pattern finding:

Here is a growing pattern made with small cubes.

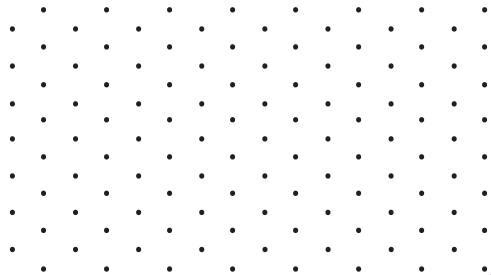


Sides of 2 squares | Sides of 3 squares | Sides of 4 squares | Sides of 5 squares

Draw the next model in the pattern. Use the dot paper to draw on.

Suppose you have 76 small cubes. You use all the cubes to make a model in this pattern.

How many squares are along each side of your model?



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Learning at home: Notes for whānau

When your child finishes each activity, ask them to add a mouth to the face to show how they felt about that activity.

Problem 1:

Encourage your child to use a systematic method to record the height of the frog as time passes. A table is a good method.

	Day One		Day Two		Day Three		Day Four		Day Five	
Time	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
Height	5	3	8	6	11	9	14	12	17	15

Effectively the frog is climbing 5 - 2 = 3 metres per day. After night on Day Six it is at a height of 18 metres. The following day it climbs five metres and reaches the top of the well (assuming it has the strength to get out).

Problem 2:

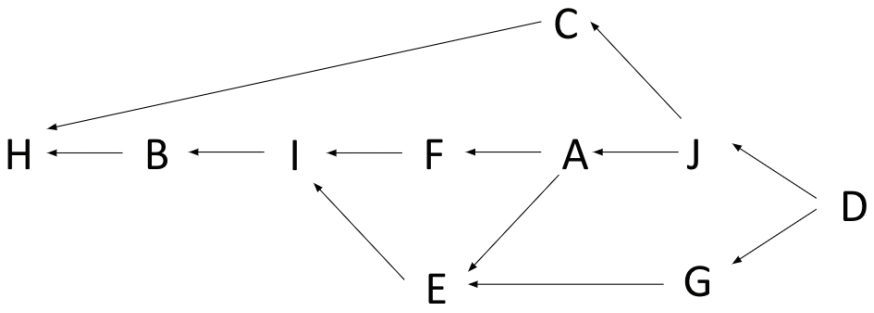
Make sure that your child has a calculator available. They may approach the problem using trial and error though that might take a while. Encourage them to take a more strategic approach with questions like:

- If all 135 animals were chickens, how many legs would that be? (135 x 2 = 270)
- If all 135 animals were pigs, how many legs would that be? (135 x 4 = 540)
- Are there more chickens or more pigs? How do you know? (348 legs is closer to 270 than 540)
- If you start with 135 chickens and change a chicken for a pig, what happens to the number of legs?
- (The number of legs increases by two as pigs have two more legs than chickens).

Since 348 legs is 78 more legs than 270 the 78 extra legs need to be made up from exchanging chickens for pigs. 78 ÷ 2 = 39 so there must be 39 pigs. The number of chickens is 135 – 39 = 96. Note that there are more sophisticated ways to solve the problem, including using algebra.

Problem 3:

Since the last pictures to be put on the notice board are on top it is a good idea to work backwards. Make a diagram with the latest notices on the right and work to the left to include the earliest notices.



Note that there are several orders that could work since the branches are independent (not related to each other). However H is always the first notice.

Finding factors:

The problem requires students to find common factors for 72 and 60. Factors are numbers that multiply to give the target number. For example, 8 and 9 are factors of 72 as 8 x 9 =72. A systematic approach to finding all the factors is the start with the smallest factor, always 1, and work up.

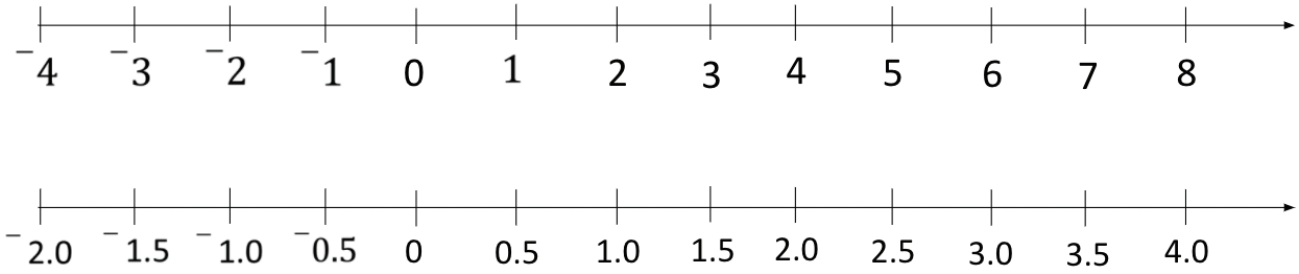
Factors of 72: 1 x 72, 2 x 36, 3 x 24, 4 x 18, 6 x 12, 8 x 9 (after this the factors repeat).

Factors of 60: 1 x 60, 2 x 30, 3 x 20, 4 x 15, 5 x 12, 6 x 10 (after this the factors repeat).

The common factors are in both lists and give the possible numbers of equal bags Kuia can make.

The factors 1, 2, 3, 4, 6, and 12 are common to both lists. Kuia could make 1 bag containing 72 vanilla and 60 sultana cookies, 2 bags containing 36 vanilla and 30 sultana cookies, 3 bags containing 24 vanilla and 20 sultana cookies, 4 bags containing 18 and 15 sultana cookies, 6 bags containing 12 vanilla and 10 sultana cookies, or 12 bags containing 6 vanilla and 5 sultana cookies.

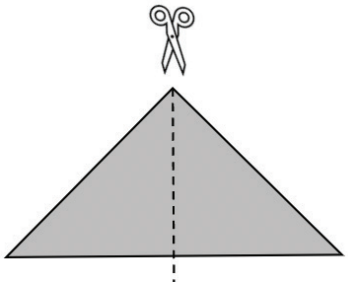
Placing numbers:



Your child should show understanding of the place of negative numbers in relation to zero and the positive numbers and recognise that negative decimals locate in the same way.

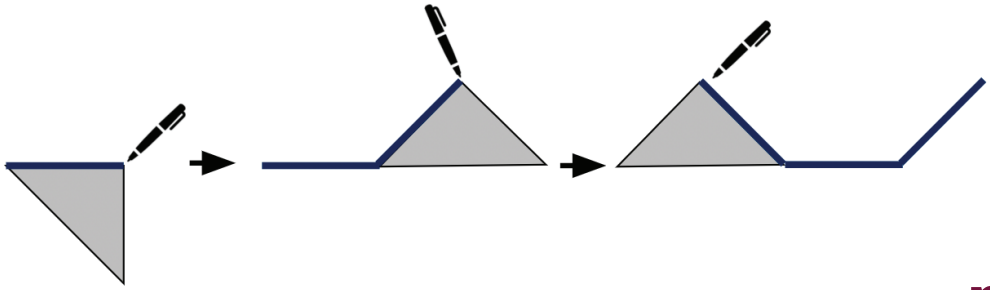
45 degrees:

The angle 45^0 is a useful benchmark for estimating other angles as it is half-way between a non-turn (0^0) and a quarter turn (90^0).



The triangle can be cut in half in this way. Note that the cut line goes from the 90^0 angle to the midpoint of the opposite side. Since the 90^0 angle is cut in half it must form two 45^0 angles.

Drawing the regular octagon can begin as follows:



A cupful:

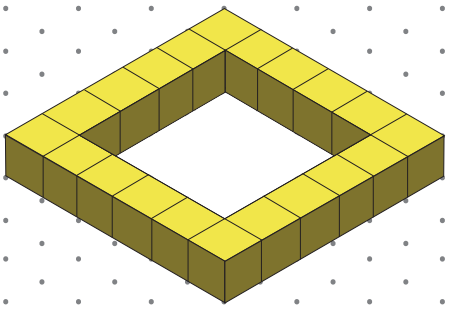
The capacity of a cup varies between about 200cm³ and 300cm³. The standard measure is 237cm³. It is not important to the success of the task that your child knows that fact. Initially expect them to create a box in the shape of a rectangular prism (cuboid) as shown. There box will be an estimate as they will not have the exact measure of the cup. For example, they might make a box that is 10cm x 8cm x 4cm. You child should know how to calculate the volume of the box using multiplication. Since 10 x 8 x 4 = 320cm³ the box is likely to be a bit big.

- How can you make the box hold less volume?
- Which dimension/s (edge length/s) will you reduce? Why did you choose that dimension?

Your child might play with the dimensions to find a box size less than 320cm³. Good sizes are 10 x 5 x 5 = 250cm³ or 10 x 8 x 3 = 240cm³ or 8 x 5 x 5= 200cm³.

Pattern finding:

Does your child notice what changes and what remains the same as the pattern grows?



They should see that the sides of the model grow by one small cube each time the pattern grows. The cubes on the four corners are constant to all pattern models.

The fifth pattern is shown to the right.

Structuring the pattern will support your child to develop a rule. In this pattern, structures they might notice are:

- There are four sides, so each model has four multiplied by some number of small cubes, e.g., Pattern 5 has 4 x 4 = 16 cubes.
- Each side has the pattern number of cubes, e.g., Pattern 5 has five cubes on each side. That is 4 x 5 = 20 but the corners overlap so the total number of cubes is 20 - 4 =16 cubes.
- There are always four corner cubes. The number of cubes of each side after the corners are removed is always two less than the pattern number, e.g., Pattern 5 is made up of 4 x 3 = 12 cubes plus four for the corners equals 16 cubes.

Pose problems like this so your child can apply the structure they see: What will the tenth pattern look like?

Expect answers like: It will have 10 cubes along each side. 4 x 10 = 40 but you need to take away four because the corners are counted twice.

Given the condition that the total number of cubes is 76, your child will need to apply the structure in reverse. For example, if four is added to 76 that gives 80 (allowing for the double count on the corners). 80 ÷ 4 = 20 which is the number of cubes along each side.