Notes for parents (1).

The purpose of the activity is to help your student to:

- Predict further members of a linear pattern.
- Create a rule for the pattern and express the rule using algebra.
- Graph a linear pattern and connect the slope of the graph to the rule.

Here is what to do:

Read through the activity page together with your student. Ask them what they notice about what happens to the formation as a new stage is added.

They might notice that the formation has four arms (North, East, South and West) and see that three skydivers are added to each arm to form the next stage.

Noticing that 4 x 3 = 12 skydivers are added for each new stage will allow your student to anticipate through to stage eight of the pattern. Some students will create a table of values like this:

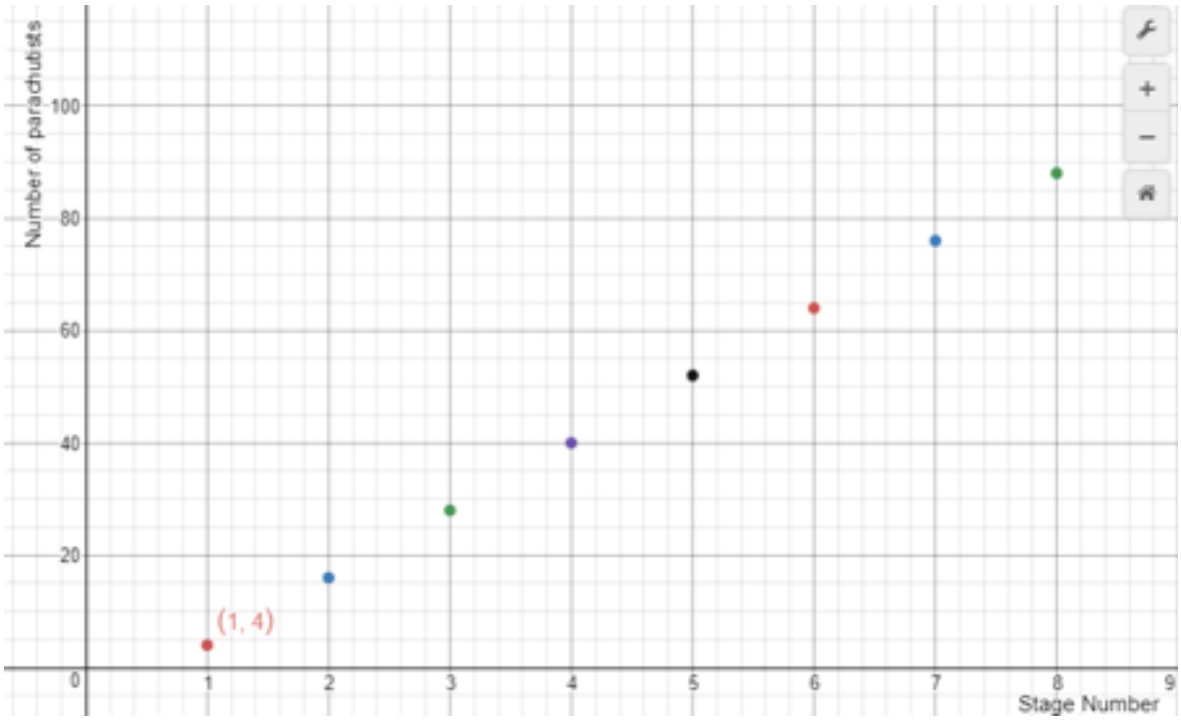
Stage of Pattern	1	2	3	4	5	6	7	8
Number of skydivers	4	16	28	40				

If they concentrate only on the number pattern bring them back to the picture to see where 12 people are being added each time.

Finding an efficient way to find the stage eight value, rather than adding 12 each stage, is important. From the first stage 7 x 12 = 84 new people will be added to form stage eight, so the total number of people will be 84 + 4 = 88. Another way to calculate to number of people is to imagine 8 x 12 = 96 then subtract 8 to get 88, since the first stage had only four people, not 12.

The values from a table can be used to create a graph of the relationship between stage numbers and number of skydivers. Plotting the point individually gives this display.

Notes for parents (2).



The points all lie on a straight line, so the slope of the graph is constant. Ask why this happens. Twelve is added to the number of skydivers as another stage is added. The slope of the graph is 12, a rise of 12 for each one unit of run (across).

Your student should be familiar with writing equations for linear relationships like this. The equation comes from the second of the rules given above for the table.

$p = 12s - 8$

Note that 12s means the stage number multiplied by 12 and that 12 is the slope of the graph. The 'adjustment' of – 8 is needed because the first stage has four skydivers, eight less than 12.

Points to note:

Attending visually to a pattern is called figural thinking and can be powerful in leading to generalisations about patterns. Numeric methods often assume dominance in the teaching of algebra because they are useful for any pattern. A connection between figural and numeric reasoning is preferable.

Constant differences of 12 in the growth of the number of skydivers as stages are added indicates a linear pattern. Linear patterns are called that because their graphs are straight lines or points that lie of a straight line.

Notes for parents (3). Activity next page.

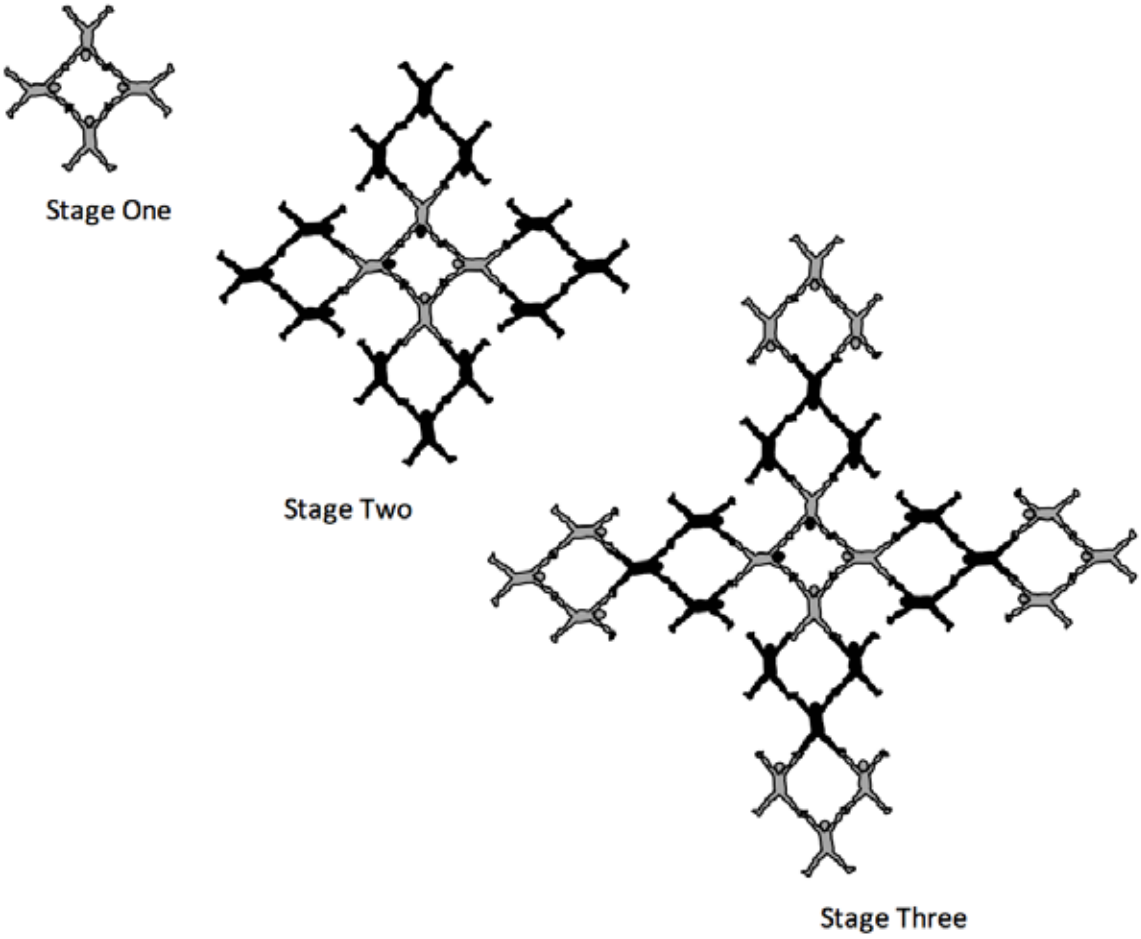
The relationships between the equation, p = 12s – 8, are as follows:

i) The gradient is the co-efficient (multiplier) 12 of the independent variable, s in this case (x on a Cartesian number plane).

ii) The intercept with the vertical axis, -8, gives the constant adjustment needed for the equation to work (y intercept on a Cartesian number plane).

The Taupo skydivers' club aim to set a new world record. People in the club will try to make stage eight of this pattern during freefall.

It's ambitious. *How many skydivers will they need?*



Draw a graph to represent the number of skydivers joined at each stage of the pattern. You may like to use an online graphing tool to do that.

Write an equation for the pattern, using s to represent the stage number, and p to represent the number of people who are joined.