

The Seventh Wave

Purpose:

The purpose of this activity is to engage students in using mathematical strategies to solve a problem involving a sequence.

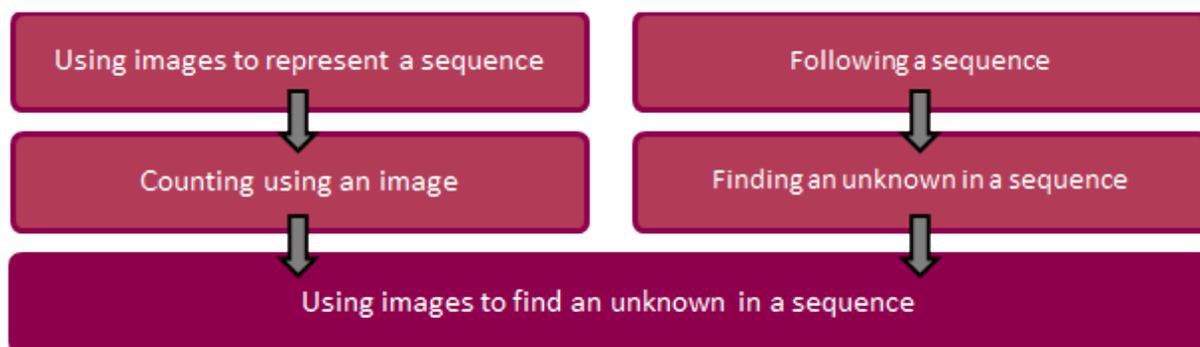
Achievement Objectives:

NA3-3: Know counting sequences for whole numbers.

NA3-8: Connect members of sequential patterns with their ordinal position and use tables, graphs, and diagrams to find relationships between successive elements of number and spatial patterns.

Description of mathematics:

The background knowledge and skills that should be established before and/or during this activity are outlined in the diagram below:



Using images to represent a sequence

Give the next three symbols in this sequence. $\rightarrow \downarrow \uparrow \rightarrow \rightarrow \downarrow \uparrow \rightarrow \dots$

Counting using an image

How many \rightarrow will there be in the first 20 terms of this sequence? $\rightarrow \downarrow \uparrow \rightarrow \rightarrow \downarrow \uparrow \rightarrow \dots$

Following a sequence

Jacqui, Ana and Rita take it in turns to do the dishes each night. If Jacqui, does the dishes on a Monday, show the dishes roster for each of the days that week.

Finding an unknown in a sequence

Jacqui, Ana and Rita take it in turns to do the dishes each night. If Jacqui, does the dishes on a Monday, how many times will she do the dishes that week?

Using images to find an unknown in a sequence

Jacqui and her two sisters take it in turns to do the dishes each night. If Jacqui does the dishes on a Monday, how many days later will she be doing the dishes on a Tuesday night?

This activity may be carried out with step by step guidance, or by allowing the student to follow their own method of solution. The approach should be chosen in sympathy with students' skills and depth of understanding.

Activity:

Sam the surfer knows that the seventh wave in each set is the biggest. It is also the middle wave in each set.

Sam is surfing with five other surfers. To be safe, they each take a wave in turn. Sam takes the very first wave of the first set.

They are in the water long enough to surf every wave of ten sets. How many 'seventh waves' does Sam get?



The conceptual approach

The student is able to use appropriate strategies to solve a problem involving sequences.

Prompts from the teacher could be:

1. Think about how many waves are in each set.
2. Think about how many surfers are taking turns to catch these waves.
3. How many of the biggest waves could Sam possibly get?
4. Test out your suggestions for (3) to find which actually works. Which is the solution to this problem?

10 big waves \div 6 surfers
= 1 remainder 4

answer is one or two
two if Sam gets one of the
first 4 big waves.

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
S f f f f f S ✓ f f f f f f f S

next set is f first

So two times.

T: Can you please talk me through your reasoning?

S: Well, first, there are six people, and 10 big waves, so they share out at one or two. The other possible answer is ten, if the order was just right; Sam would always be on the biggest wave.

T: So how did you choose one, two or ten?

S: I worked out the first set. 15 waves, because that's 6 before the 7th one and then 6 more to make it the middle one. Sam got the first big wave.

T: And then how did you know he wouldn't always get it?

S: He gets the last wave of the first set, so his next wave will be [counts out] six!

T: Did you work that out before?

S: No, I just knew the order would change, because he didn't start the next set.