In sequence one, each next term is as result of multiplication by 3, so 3, 9, 27...

Alison rewrites her Sequence (S) as powers, so 3, 3x3, $3x3^2$ which is just (3x3x3)... and so on until $3x3^{14}$

Then the she does a little trick whereby she multiplies the sequence by the common ratio, so, 3S= 3x3, $3x3^2$, $3x3^3$... $3x3^{15}$

Finally she subtracts S from 3S, and most of the terms cancel out to leave only 2S= $3x3^{15}$-3

To follow this up you just simplify the answer to S=($3x3^{15}$-3)/2

Thus, the total of the sequence is 21523359

This method is fairly self-explanatory, and can be applied in the same way to sequences 2 (answer 20475), sequence 3 (which I will go on to explain) and sequence 4.

It gets a tad more complicated on sequence 3 with the use of sigma, but if you understand that, it continues in much the same way. Σ i=1, 20, means that term i can have a progressing value from 1 up to and including 20. This makes the sequence look a little like this: 1, 2, 3, 4... 20

When this is applied to the sequence in the question ($3x2^{i-1}$), it appears as $3x2^0$ (because sigma increases with each term, its initial value is 1, take 1 is 0. And for reference, any number to the power of zero is one.) so it continues $3x2^1$, $3x2^2$... $3x2^{19}$

We can make it even easier by taking the x3 outside of the bracket, creating sequence S/3= 2^0, 2^1, 2^2... 2^{19}

Then we continue as Alison mentioned and create a second sequence using the common ratio (2S/3), and subtract the first sequence from this leaving a result of S/3= 2^{20}-2^0

Multiply this by 3 and you are left with total 3145725

And finally we use this to solve sequence 4, which multiplies by ½ so: ½, ¼... and we try to find this to the 10th term.

When we take S from ½S we have negative S/2, so when we go on to find S the formula is 2(-1/2x $1/2^{10}$+ ½) which becomes -1x $½^{10}$ +1