Homer's Broken Remote: Solution

Problem: Homer's TV remote control has some broken digit keys. Given the keys that work and a '+' (channel-up) and '-' (channel-down), find the shortest sequence to get between any two channels. After digits, you need to hit `E' (enter) to jump to that channel.

Example:

Max Channel: 330

Working Digits: 4 and 5

Start Channel: 40

Target Channel: 50

Optimal Sequence: "5 4 E - - - -" (Length = 7)

Our Solution

Part I: Determine which channels can be accessed using just the digit keys, and determine the entry sequence for each.

Example:

Max channel = 330 and **working digits**: 4 and 5

Enterable Channels:

Channel:	Entry Sequence:
4	4E
5	5E
44	44E
45	45E
54	54E
55	55E

Method:

- Enumerate all channels from 1 to maxChannel.
- Convert the channel number into its digits, and test that every digit works.

Our Solution

Part II: Write a procedure that determines the minimum number of '+' or '-' to get from one channel to another. Need to consider wrap around.

Example:

Max channel = 330.

Examples:

Start s:	Target t:	Sequence:	
4	8	++++	[4+]
5	2	---	[3-]
327	3	++++++	[6+]
120	329	----…	[121-]

Method: Two cases:

($s \leq t$): Take the min going up by (t-s) or down by (s+(max-t)).

($s > t$): Take the min going down by (s-t) or up by (t+(max-s)).

Our Solution

Final: Combine parts I and II and take the best overall.

Case 1: No digit entry at all: Compute the best +/- sequence from starting channel.

Case 2: For each "enterable" channel: Compute the sum of:

- Length of sequence to enter this channel.
- Length of +/- sequence to get to target.

Example:

Start: 40 and **Target:** 50.

Channel:	Digit:	+/-:	Total Length:	
(40)	(none)	[10+]	0 + 10 = 10	
4	4E	[46+]	2 + 46 = 48	
5	5E	[45+]	2 + 45 = 47	
44	44E	[6+]	3 + 6 = 9	
45	45E	[5+]	3 + 5 = 10	
54	54E	[4-]	3 + 4 = 7	← Best overall
55	55E	[5-]	3 + 5 = 10	