

For each problem referenced in the article, you will see first the solution using the Not Just for Retirement Calculator, and then using a spreadsheet program (in this case, Excel)

1. Joe wants to know if he can afford to retire. Assumptions:

- Income needed in current dollars: \$30,000
- Years for the money to last: 30 years
- Assumed rate of return: 5%
- Increase / year in withdrawals: 3%

To compute the present value of an “annuity”, either with a fixed or increasing amount, you would use the green keys and the “replacement \$” calculate key, and make the following entries

- a) Enter 30000, press the GREEN “annual amount” button.
- b) Enter 3, press the GREEN “% increase / year” button
- c) Enter 30, press the GREEN “years” button
- d) Enter 5, press the TRI-COLOR (GRB) “ROR” button
- e) Press the GREEN “replacement \$” button.

The value displayed (690458) is how much he would need to be able to afford retirement based on the assumptions indicated above.

To calculate how much he would need if inflation was 4% instead of 3%, if the calculator has not been cleared, all he would need to do is

- f) Enter 4, press the GREEN “% increase / year” button
- g) Press the GREEN “replacement \$” button.

The value displayed (786086) is how much he would need to be able to afford retirement if the annual increase in withdrawals was 4% instead of 3%.

(note the cumulative present values shown in the table below for year 30 are the same as those computed using the calculator)

annual increase:			3%	4%		
year	annual income	PV of annual	cumulative PV	annual income	PV of annual	cumulative PV
1	30000	30000		30000	30000	
2	30900	29429	59429	31200	29714	59714
3	31827	28868	88297	32448	29431	89146
4	32782	28318	116615	33746	29151	118297
5	33765	27779	144394	35096	28873	147170
6	34778	27250	171643	36500	28598	175768
7	35822	26731	198374	37960	28326	204094
8	36896	26221	224595	39478	28056	232151
9	38003	25722	250317	41057	27789	259940
10	39143	25232	275549	42699	27524	287464
11	40317	24751	300301	44407	27262	314726
12	41527	24280	324581	46184	27003	341729
13	42773	23818	348398	48031	26745	368474
14	44056	23364	371762	49952	26491	394965
15	45378	22919	394681	51950	26238	421203
16	46739	22482	417163	54028	25989	447192
17	48141	22054	439217	56189	25741	472933
18	49585	21634	460851	58437	25496	498429
19	51073	21222	482073	60774	25253	523682
20	52605	20818	502891	63205	25013	548695
21	54183	20421	523312	65734	24774	573469
22	55809	20032	543344	68363	24538	598007
23	57483	19651	562995	71098	24305	622312
24	59208	19276	582271	73941	24073	646385
25	60984	18909	601180	76899	23844	670229
26	62813	18549	619729	79975	23617	693846
27	64698	18196	637925	83174	23392	717238
28	66639	17849	655774	86501	23169	740407
29	68638	17509	673283	89961	22949	763356
30	70697	17176	690458	93560	22730	786086

2. Joe wants to know how much he'll need at 62

Assumptions:

- Income needed in current dollars: \$30,000
- Years until 62: 22
- Assumed inflation rate: 4%

To compute the future value of a lump sum, you would use the yellow keys and make the following entries

- a) Enter 30000, press the **YELLOW** "current amount" button
- b) Enter 4, press the **YELLOW** "% increase / year" button
- c) Enter 22, press the **YELLOW** "years" button
- d) Press the **YELLOW** "future amount" button.

The value displayed (71098) is what he would need in annual income at 62 to be inflation adjusted equivalent of \$30,000 at age 40 if the assumed inflation rate is 4%.

To calculate how much he would need at 62 if inflation was 5% instead of 4%, if the calculator has not been cleared, all he would need to do is

- e) Enter 5, press the **YELLOW** "% increase / year" button
- f) Press the **YELLOW** "future amount" button.

The value displayed (87758) is what he would need in annual income at 62 to be inflation adjusted equivalent of \$30,000 at age 40 if the assumed inflation rate were 5%.

annual increase:	4%	5%
age	annual income	annual income
40	30000	30000
41	31200	31500
42	32448	33075
43	33746	34729
44	35096	36465
45	36500	38288
46	37960	40203
47	39478	42213
48	41057	44324
49	42699	46540
50	44407	48867
51	46184	51310
52	48031	53876
53	49952	56569
54	51950	59398
55	54028	62368
56	56189	65486
57	58437	68761
58	60774	72199
59	63205	75809
60	65734	79599
61	68363	83579
62	71098	87758

3. Joe wants to know now much he would have in the future.

Assumptions:

- Initial investment: \$5,000
- Years the money will be invested 20 years
- Assumed rate of return: 6%
- Increase / year in withdrawals: 0%

To compute the future value of an “annuity”, either with a fixed or increasing amount, you would use the green keys and the “future amount” calculate key, and make the following entries

- a) Enter 5000, press the GREEN “annual amount” button.
- b) Enter 0, press the GREEN “% increase / year” button
- c) Enter 20, press the GREEN “years” button
- d) Enter 6, press the TRI-COLOR (GRB) “ROR” button
- e) Press the GREEN “future amount” button.

The value displayed (183928) is how much he would accumulate if he invested the same \$5000 each year.

To calculate how much he would accumulate if he increased his investments 3% / year, if the calculator has not been cleared, all he would need to do is

- f) Enter 3, press the GREEN “% increase / year” button
- g) Press the GREEN “future amount” button.

The value displayed (233504) is how much he would accumulate if he invested \$5000 the first year, and then increased the investment amount by 3% / year.

annual increase:	0%		3%	
year	annual investment	amount accumulated	annual investment	amount accumulated
1	5000	5000	5000	5000
2	5000	10300	5150	10450
3	5000	15918	5305	16382
4	5000	21873	5464	22828
5	5000	28185	5628	29825
6	5000	34877	5796	37411
7	5000	41969	5970	45626
8	5000	49487	6149	54513
9	5000	57457	6334	64118
10	5000	65904	6524	74489
11	5000	74858	6720	85677
12	5000	84350	6921	97739
13	5000	94411	7129	110732
14	5000	105075	7343	124719
15	5000	116380	7563	139765
16	5000	128363	7790	155941
17	5000	141064	8024	173321
18	5000	154528	8264	191984
19	5000	168800	8512	212016
20	5000	183928	8768	233504

3. Joe wants to know what rate of return he needs to earn to achieve his funding goals. Assumptions:

- Retirement funds : \$750,000
- Years the money needs to last: 30 years
- Increase / year in withdrawals: 5%
- Year 1 income needed: \$50,000

In this particular calculation, the value to be computed would normally be one of the values entered, while the value that would normally be computed is one of the assumed values. In cases such as this, you would need to try different values for rate of return until the Year 1 value computed equals the assumed value (in this case, \$50,000. There is no specific rule to follow, but I generally recommend taking the retirement amount and divide it by the year 1 value (in this case $750,000 / 50,000 = 15$) and use this as the initial rate of return.

- a) Enter 750000, press the **BLUE** "retirement funds" button.
- b) Enter 5, press the **BLUE** "% increase / year" button
- c) Enter 30, press the **BLUE** "years" button
- d) Enter 15, press the TRI-COLOR (**GRB**) "ROR" button

Press the **BLUE** "yr 1 spending" button. The value displayed (69772) is how much he could withdraw his first year. Since this is higher than the 50000 that we are looking for, we know the 15% rate of return is too high. Again, there is no set rule. You could reduce the rate of return 1% / year, or cut it in half. For now, let's cut the rate to 8%. Assuming that the calculator had not been cleared, you would do the following:

- e) Enter 8, press the TRI-COLOR (**GRB**) "ROR" button
- f) Press the **BLUE** "yr 1 spending" button.

The value displayed (36518) is less than the 50000 you want to reach, so you know the correct interest rate is between 8% and 15%. Suppose you try 10%.

- g) Enter 10, press the TRI-COLOR (**GRB**) "ROR" button
- h) Press the **BLUE** "yr 1 spending" button.

The value displayed (45315) is still less than the 50000 you want to reach, but not by much. You might now try increasing the rate of return by 1% until the value displayed when you press the blue "yr 1 spending" button equals 50. If you then

- i) Enter 11, press the TRI-COLOR (**GRB**) "ROR" button
- j) Press the **BLUE** "yr 1 spending" button.

The value displayed (49976) is only \$24 below the desired amount. You could try 11.1% (result is 50450), which tells you that the rate of return Joe would need is between 11% and 11.1%.

Which also means that if he invested in CD's earning 5%, he would run out of money far sooner than he planned. If you wanted to find out just how much sooner, you would enter 5 as the ROR, then, reduce the value of the Blue "years" entry until the Blue "yr 1 spending" computation produced a result equal to (or near) 50000 (the answer that would produce that result is 15 years, a lot less than the 30 years Joe wanted the money to last).

NOTE: the actual year 1 amount that could be withdrawn assuming 11% rate of return was \$49976, not the \$50,000, so both the calculations are included below. As you can see, using the 49976 year 1 amount, the shortfall for year 30 is only \$110, a very small amount relative to the initial \$750,000 investment)

assumed ROR:		11%		
beginning fund balance		750000		
year	year 1 income wanted	remaining balance	year 1 income calculated	remaining balance
1	50000	777000	49976	777027
2	52500	804195	52475	804253
3	55125	831468	55099	831561
4	57881	858681	57853	858815
5	60775	885675	60746	885857
6	63814	912266	63783	912501
7	67005	938240	66973	938537
8	70355	963352	70321	963719
9	73873	987322	73837	987769
10	77566	1009829	77529	1010366
11	81445	1030506	81406	1031146
12	85517	1048938	85476	1049694
13	89793	1064651	89750	1065538
14	94282	1077110	94237	1078144
15	98997	1085705	98949	1086907
16	103946	1089752	103897	1091141
17	109144	1088476	109091	1090075
18	114601	1081001	114546	1082838
19	120331	1066344	120273	1068447
20	126348	1043396	126287	1045797
21	132665	1010911	132601	1013648
22	139298	967491	139231	970602
23	146263	911563	146193	915095
24	153576	841365	153502	845367
25	161255	754922	161178	759451
26	169318	650021	169236	655138
27	177784	524183	177698	529958
28	186673	374637	186583	381146
29	196006	198280	195912	205609
30	205807	-8355	205708	-110