

Retirement Planning Workbook

Version 2.0

A Practical Retirement Planning Workbook

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*For educational and personal planning purposes.
This workbook does not constitute individualized financial, investment, tax, or legal advice.*

Section I: Retirement Needs Analysis

Most household expenses continue in retirement. Some costs usually decrease, while others may increase. Use the worksheet below to estimate the annual amount your investments must support.

How expenses may change

Expenses That May Decrease	Expenses That May Increase
• Savings no longer needed for retirement	• Vacation and travel
• FICA payroll taxes	• Hobby costs (golf, hunting, crafts, etc.)
• Mortgage payments or interest that ends	• Second-home costs
• Auto expenses during a lower-driving period	• Lifestyle changes
• Work-related costs (clothing, coffee, lunches)	• Health and medical costs
• Insurance costs that may decline	• Higher prices caused by inflation
• Other: _____	• Gifts or support for family members

Calculate Retirement Budget in Today's Dollars (Annual) - Top-Down Method

Start with your current annual household spending. Subtract expenses that should end or decrease. Add expenses that should increase. Then subtract dependable retirement income that will directly reduce the amount your investments must provide.

Completed Example

Annual budget adjustment	Operation	Amount
Current annual household spending	Start	\$100,000
Mortgage interest ending	Subtract	(\$12,000)
FICA payroll taxes ending	Subtract	(\$6,000)
Car payment ending	Subtract	(\$8,000)
Additional travel	Add	\$12,000
Additional hobby spending	Add	\$5,000
Pension income	Subtract	(\$6,000)
Example annual retirement budget	BOX 1	\$85,000

**BE REALISTIC
ABOUT WHAT
EXPENSES ARE
REALLY ENDING**

Section I: Retirement Needs Analysis

Your Turn

Annual budget adjustment	Operation	Your amount
Current annual household spending	Start	\$ _____
		\$ _____
		\$ _____
		\$ _____
		\$ _____
		\$ _____
		\$ _____
Other adjustment: _____		\$ _____
Annual retirement budget in today's dollars	BOX 1	\$ _____
Result interpretation: Box 1 is the estimated annual amount your retirement plan must provide in today's purchasing power.		
Common mistake check: Do not subtract ordinary savings twice. Only remove spending that is already included in your current annual household budget.		

Model Assumptions

Enter one consistent set of assumptions. These values will be reused in the retirement-model calculations.

Re-evaluate these assumptions in your annual reviews.

**AVERAGE
INFLATION OVER
THE PAST
SEVERAL
DECADES IS 4.2%**

Box	Assumption	Your value	Meaning / calculation
A	Life expectancy	_____ years	How long you expect to live
B	Retirement age	_____ years	Expected age at retirement
C	Nominal rate of return	_____ %	Expected annual return on investments
D	Inflation rate	_____ %	Expected annual loss of purchasing power
E	Remaining Work Life (RWL)	_____ years	Retirement age - current age
F	Retired Life Expectancy (RLE)	_____ years	Life expectancy - retirement age

Completed Example

**AVERAGE
MARKET GAINS
OVER THE LONG-
TERM ARE ~12%**

Remaining Work Life (Box E)	Retired Life Expectancy (Box F)
Retirement age - Current age	Life expectancy - Retirement age
65 - 45 = 20 years	90 - 65 = 25 years
BOX E = 20 years	BOX F = 25 years
Common mistake check: Convert percentages to decimals before using them in formulas: 7% = 0.07 and 3% = 0.03.	

Section I: Retirement Needs Analysis

Calculate Real Rate of Return

$$\text{Real rate of return} = \frac{1 + \text{Box C}}{1 + \text{Box D}} - 1$$

(Box C and Box D are a decimal)

Record the result as BOX G.

Completed Example

Real-rate calculations	Operation	Result
Nominal Rate of Return (Box C)	9.5 % =	0.095
Inflation Rate (Box D)	4.2 % =	0.042
Divide growth rates	$1.095 \div 1.042 =$	1.0509
Subtract 1		-1
Real Rate of Return		0.0509
Real rate of return ¹	Box G =	5.09%

IT IS WISE TO
BE CONSERVATIVE
WITH BOTH
VARIABLES

Your Turn

Real-rate calculations	Operation	Result
Nominal Rate of Return (Box C)	____ % =	0.____
Inflation Rate (Box D)	____ % =	0.____
Divide growth rates (add 1 to each rate)	$1.____ \div 1.____ =$	_____
Subtract 1		-1
Real Rate of Return		0.____
Real rate of return	Box G =	%

Common mistake check: Do not simply subtract inflation from the nominal return. Use the full formula above.

¹ Why use the real rate? Retirement spending is measured in purchasing power, not nominal dollars. Using the real rate of return removes the effects of inflation so the retirement models are expressed in constant purchasing-power terms.

Section I: Retirement Needs Analysis

Future Retirement Expenses (First Year)

Inflate your annual retirement budget from today's dollars to the dollars you expect to spend during your first year of retirement.

Completed Example

Inflation rate (Box D)	4.2% = 0.042
Remaining Work Life (Box E)	20 years
Inflation factor $(1 + \text{Box D})^{\text{Box E}}$	$(1 + 0.042)^{20}$ equals 2.277
<i>times</i> the Annual retirement budget (Box 1)	x \$85,000
Future annual retirement expenses	\$193,541
Round up result to nearest \$1,000	BOX 2 = \$194,000

Your Turn

Inflation rate (Box D)	_____ % = 0._____
Remaining Work Life (Box E)	_____ years
Inflation factor $(1 + \text{Box D})^{\text{Box E}}$	$(1 + 0._____)$ _____ = _____
<i>times</i> the Annual retirement budget (Box 1)	x _____
Future annual retirement expenses	_____
Rounded up result to nearest \$1,000 ²	BOX 2 = \$ _____
Result interpretation: Box 2 is the estimated annual spending required during the first year of retirement, expressed in future dollars.	
Common mistake check: Use Box E (years until retirement), not Box F (years in retirement), when inflating today's budget.	

² Unless you are only a few years away from retirement, rounding *up* the nearest thousand dollars will not drastically impact your plan and provides a small margin for error.

Section II: Annuity Model Calculations

This calculation estimates the capital needed at retirement when the first year of spending is set aside immediately and the remaining annual payments are funded as an annuity. This model's end value at Life Expectancy age is *zero dollars*. If you surpass your planned life expectancy, you will run out of money. Additionally, there is *zero room* for error in this model's assumptions.

Completed Example

Real Rate of Return (Box G)	5.09% =	0.0509
Retired Life Expectancy (Box F)	25 years	
Annuity Factor $(1 - (1 + \text{Box G})^{-\text{Box F}})$	$1 - (1 + 0.0509)^{-25} =$	0.7110
<i>Divided by</i> Real Rate of Return		$\div 0.0509$
Result		13.9677
<i>Multiply by</i> First year's expense growth adjustment $(1 + \text{Box G})$	$(1 + 0.0509) =$	$\times 1.0509$
<i>Multiply by</i> Future annual retirement expenses (Box 2)		$\times \$194,000$
Total retirement capital target	Box 3 =	2,847,656
Rounded result (nearest \$1,000)	BOX 3 =	\$2,848,000

Your Turn

Real Rate of Return (Box G)	_____ % =	0. _____
Retired Life Expectancy (Box F)	_____ years	
Annuity Factor $(1 - (1 + \text{Box G})^{-\text{Box F}})$	$1 - (1 + 0. _____)^{- _____} =$	0. _____
<i>Divided by</i> Real Rate of Return (Box G)		$\div 0. _____$
Result		_____
<i>Multiply by</i> First year's expense factor $(1 + \text{Box G})$	$(1 + _____) =$	$\times 1. _____$
<i>Multiply by</i> Future annual retirement expenses (Box 2)		$\times \$ _____$
Total retirement capital target	Box 3 =	_____
Rounded result (nearest \$1,000)	BOX 3 =	\$ _____
Result interpretation: Box 3 is the estimated capital needed at your planned retirement date required by the annuity model.		
Common mistake check: Box F is <i>negative</i> exponent in the annuity factor's calculation. The rate used throughout is the Real Rate of Return calculated above in Box G		

Section III: Capital Preservation Model Calculations

This calculation adds enough capital to the annuity-model balance while preserving the original retirement principal. This model determines the additional capital required so that the original retirement principal remains intact at the end of retirement.

Completed Example

Capital preservation calculation	Completed example	
Nominal Rate of Return (Box C)	9.5% =	0.095
Retired Life Expectancy (Box F)	25 years	
Annuity-model capital target (Box 3)		\$2,848,000
<i>Divided by</i> Annuity rate $(1 + \text{Box C})^{\text{Box F}}$	$(1 + 0.095)^{25} =$	$\div 9.6684$
Additional capital needed at retirement		\$294,569
<i>Add to</i> annuity-model capital target (Box 3)		+ 2,848,000
Total retirement capital target	Box 4 =	3,142,569
Rounded result (nearest \$1,000)	BOX 4 =	\$3,143,000

Your Turn

Capital preservation calculation	Completed example	
Nominal Rate of Return (Box C)	_____ % =	0. _____
Retired Life Expectancy (Box F)	_____ years	
Annuity-model capital target (Box 3)		\$ _____
<i>Divided by</i> Annuity rate $(1 + \text{Box C})^{\text{Box F}}$	$(1 + 0. \text{_____}) \text{---} =$	$\div \text{_____}$
Additional capital needed at retirement		\$ _____
<i>Add to</i> annuity-model capital target (Box 3)		+ _____
Total retirement capital target	Box 4 =	_____
Rounded result (nearest \$1,000)	BOX 4 =	\$ _____
Result interpretation: Box 4 is the estimated capital needed at your planned retirement date required to fund the same annual payments as the annuity model while preserving the full Box 3 balance through the end of retirement.		
Common mistake check: Divide Box 3 by the annuity rate to find the additional capital. Do not multiply Box 3 by the annuity rate. Then add the additional capital to Box 3.		

Section IV: Purchasing Power Preservation Model Calculations

This calculation estimates the retirement-date capital needed when annual withdrawals must *increase each year to maintain purchasing power*. Use the real rate of return to determine the additional capital needed beyond the annuity-model amount.

Completed Example

Purchasing power preservation calculation	Completed example	
Real Rate of Return (Box G)	5.09% =	0.0509
Retired Life Expectancy (Box F)	25 years	
Annuity-model capital target (Box 3)		\$2,848,000
Divided by Annuity rate $(1 + \text{Box G})^{\text{Box F}}$	$(1 + 0.0509)^{25} =$	$\div 3.4597$
Additional capital needed at retirement		\$823,193
Add to annuity-model capital target (Box 3)		+ 2,848,000
Total retirement capital target	Box 5 =	3,671,193
Rounded result (nearest \$1,000)	BOX 5 =	\$3,672,000

Your Turn

Capital preservation calculation	Completed example	
Real Rate of Return (Box G)	_____ % =	0. _____
Retired Life Expectancy (Box F)	_____ years	
Annuity-model capital target (Box 3)		\$ _____
Divided by Annuity rate $(1 + \text{Box G})^{\text{Box F}}$	$(1 + 0. \text{_____}) \text{---} =$	$\div \text{_____}$
Additional capital needed at retirement		\$ _____
Add to annuity-model capital target (Box 3)		+ _____
Total retirement capital target	Box 5 =	_____
Rounded result (nearest \$1,000)	BOX 5 =	\$ _____
Result interpretation: Box 5 is the estimated capital needed at your planned retirement date required to fund annual withdrawals that maintain purchasing power in retirement years.		
Common mistake check: Use Box G, the real rate of return.		

Section V: Capitalization of Earnings Model Calculations

This calculation estimates the retirement-date capital needed to support a perpetual, inflation-adjusted income stream. Divide first-year retirement expenses by the real rate of return, then add the first year of expenses because that amount is needed immediately at retirement.

Completed Example

Capitalization of earnings calculation	Completed example	
Future annual retirement expenses (Box 2)		\$194,000
<i>Divided by</i> Real rate of return (Box G)	5.09% =	÷ .0509
Result		\$ 3,811,395
<i>Plus</i> future annual retirement expenses (Box 2)		+ 194,000
Total retirement capital target	Box 6 =	4,005,395
Rounded result (nearest \$1,000)	BOX 6 =	\$4,006,000

Your Turn

Capitalization of earnings calculation	Completed example	
Future annual retirement expenses (Box 2)		\$ _____
<i>Divided by</i> Real rate of return (Box G)	_____ % =	÷ 0. _____
Result		\$ _____
<i>Plus</i> future annual retirement expenses (Box 2)		+ _____
Total retirement capital target	Box 6 =	_____
Rounded result (up to nearest \$1,000)	BOX 6 =	\$ _____
Result interpretation: Box 6 is the estimated retirement-date capital required to support a perpetual income stream that maintains purchasing power.		
Common mistake check: Convert Box G to a decimal before dividing. Then add Box 2 because the first year of expenses is needed immediately at retirement.		

Section VI: Calculate annual and monthly savings amounts

Use the four capital targets calculated in Sections II-V to determine the annual and approximate monthly savings needed during your Remaining Work Life. First grow today's retirement savings to retirement age. Then calculate the remaining shortfall and the recurring annual contribution required to close it.

Completed Example

Savings calculation	Annuity	Capital Preservation	Purchasing Power Preservation	Capitalization of Earnings
Current retirement savings	\$464,000	\$464,000	\$464,000	\$464,000
<i>Multiply by</i> Growth factor: $(1 + 0.095)^{20}$ $(1 + \text{Box } C)^{\text{Box } E}$	$\times 6.1416$	$\times 6.1416$	$\times 6.1416$	$\times 6.1416$
Future value of current savings	\$2,849,702	\$2,849,702	\$2,849,702	\$2,849,702
Retirement capital targets*	\$2,848,000	\$3,143,000	\$3,672,000	\$4,006,000
Less: future value of current savings	- \$2,849,702			
Capital shortfall	$(\$1,702)^3$	\$293,297	\$822,297	\$1,156,298
<i>Multiply by</i> nominal rate (0.095)	$(\$162)$	\$27,863	\$78,118	\$109,884
<i>Divide by</i> Annuity factor: $(1.0905)^{20} - 1$ $(1 + \text{Box } C)^{\text{Box } E} - 1$	$\div 5.1416$	$\div 5.1416$	$\div 5.1416$	$\div 5.1416$
Annual savings needed	\$0	\$5,419	\$15,193	\$21,364
Divide by 12	$\div 12$	$\div 12$	$\div 12$	$\div 12$
Approximate monthly savings ⁴	\$0	\$451	\$1,266	\$1,780

*Example assumptions: current savings of \$464,000, a 9.5% nominal return, and 20 years of Remaining Work Life. *Capital targets are carried forward from Boxes 3, 4, 5, and 6.*

³ Negative or zero capital shortfall indicates the model's savings goal has already been reached under these assumptions. Given the errors possible in the models' assumptions, further savings is still encouraged.

⁴ Approximating monthly savings goal by dividing annual goal by 12 months. Actuals require rerunning the above using monthly figures for all variables. Monthly calculations are within 10% of the approximation.

Section VI: Calculate annual and monthly savings amounts

Your Turn

Savings calculation	Annuity	Capital Preservation	Purchasing Power Preservation	Capitalization of Earnings
Current retirement savings	\$ _____	\$ _____	\$ _____	\$ _____
<i>Multiply by</i> Growth factor: $(1 + \text{Box C})^{\text{Box E}}$	$\times$ _____	$\times$ _____	$\times$ _____	$\times$ _____
Future value of current savings	\$ _____	\$ _____	\$ _____	\$ _____
Retirement capital target	\$ _____ Box 3	\$ _____ Box 4	\$ _____ Box 5	\$ _____ Box 6
Less: future value of current savings	(\$ _____)	(\$ _____)	(\$ _____)	(\$ _____)
Capital shortfall	\$ _____	\$ _____	\$ _____	\$ _____
<i>Multiply by</i> Box C (as decimal)	\$ _____	\$ _____	\$ _____	\$ _____
<i>Divide by</i> Annuity factor: $(1 + \text{Box C})^{\text{Box E}} - 1$	$\div$ _____	$\div$ _____	$\div$ _____	$\div$ _____
Annual savings needed	\$ _____	\$ _____	\$ _____	\$ _____
Divide by 12	$\div 12$	$\div 12$	$\div 12$	$\div 12$
Approximate monthly savings	\$ _____	\$ _____	\$ _____	\$ _____
Result interpretation: Compare the four monthly savings amounts. Each column shows the recurring savings required to reach that model's retirement-date capital target, assuming equal annual contributions and the stated nominal return.				
Common mistake check: Grow current savings to retirement age <i>before</i> subtracting it from the capital target. Use the nominal rate and Box E for both the growth factor and the annuity denominator. If the capital shortfall is zero or negative, the model's savings goal has already been reached under these assumptions.				

REMINDER:
PERFORM THE
CALCULATIONS
ANNUALLY.

YOUR GOAL
SHOULD BE THE
RIGHT MOST
MODEL YOUR
BUDGET SUPPORTS!

Section VII: Look-up Sheet

Use the following on the side of your desk to quickly look up the values you'll use throughout the exercise.

Box	Description	Value
A	Life Expectancy	_____yrs
B	Retirement Age	_____yrs
C	Nominal Rate of Return	_____% or 0. _____
D	Inflation Rate	_____% or 0. _____
E	Remaining Work Life (RWL)	_____yrs
F	Retirement Life Expectancy (RLE)	_____yrs
G	Real Rate of Return	_____% or 0. _____

Box	Description	Value
1	Annual budget in today's dollars	\$ _____
2	Future annual retirement expenses	\$ _____
3	Annuity Model capital needs	\$ _____
4	Capital Preservation Model capital needs	\$ _____
5	Purchasing Power Preservation Model capital needs	\$ _____
6	Capitalization of Earnings Model capital needs	\$ _____

Section VIII: Definitions

There are a few key terms to define so that we can quickly understand the retirement models.

Real Rate of Return

The effective growth of your investments after deducting the effects of inflation on your purchasing power.

Remaining Work Life (RWL)

The amount of time remaining that you plan to work. This is your retirement age minus your current age.

Retired Life Expectancy (RLE)

The amount of time you expect to spend in retirement. This is your expected age at death minus your retirement age.