Time Value of Money

Annuities

PREP nuggets

Time Value of Money

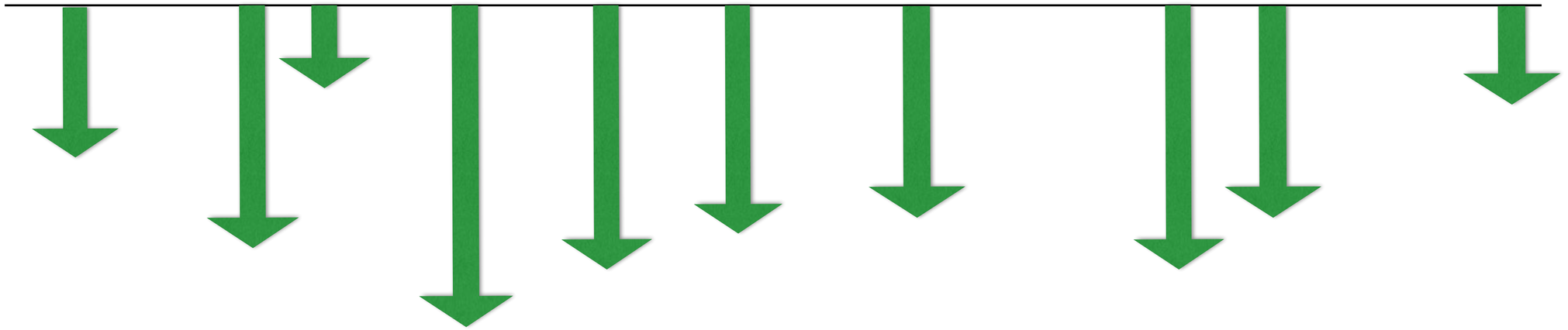
Annuities

1. Ordinary Annuities
2. Annuity Due
3. Perpetuities

PREP nuggets

Annuity

*A **Finite** set of **Level Sequential** cash flows.*

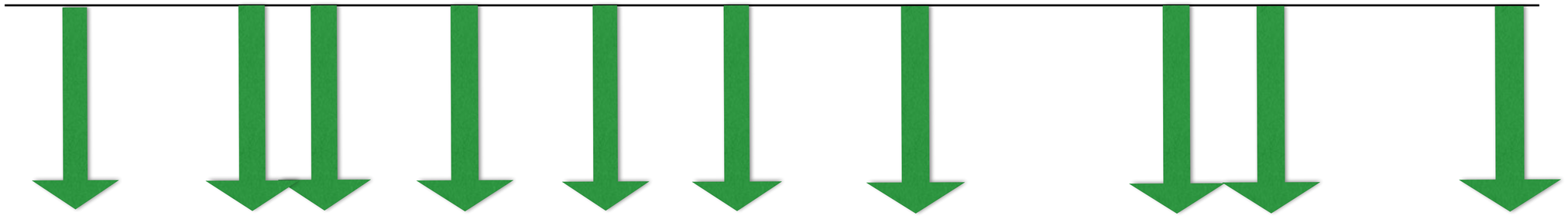


Finite ***Level*** ***Sequential***

PREP nuggets

Annuities

1. Ordinary Annuities
2. Annuity Due
3. Perpetuities

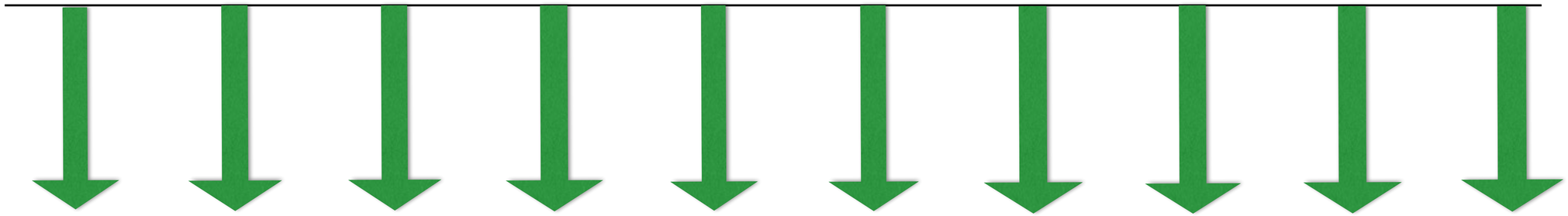


Finite **Level** *Sequential*

PREP nuggets

Annuities

1. Ordinary Annuities
2. Annuity Due
3. Perpetuities



Finite *Level* ***Sequential***

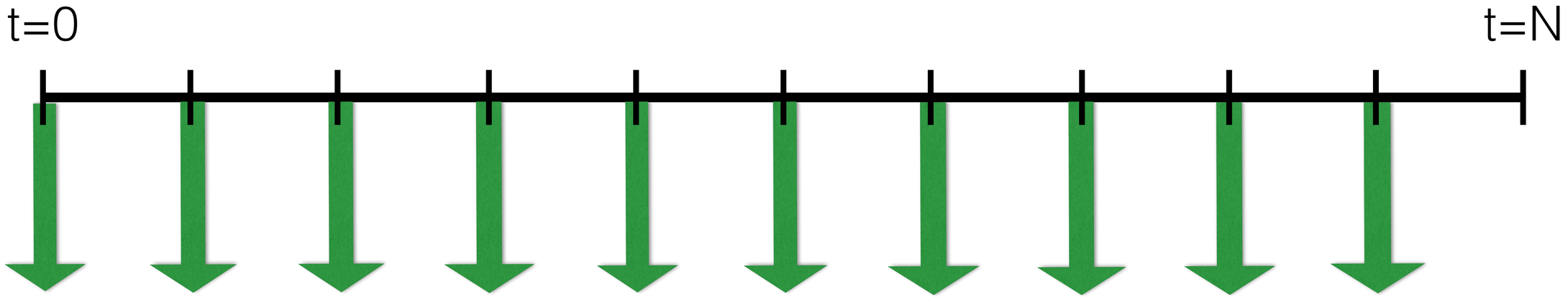
PREP nuggets

Annuities

1. Ordinary Annuities
2. Annuity Due
3. Perpetuities

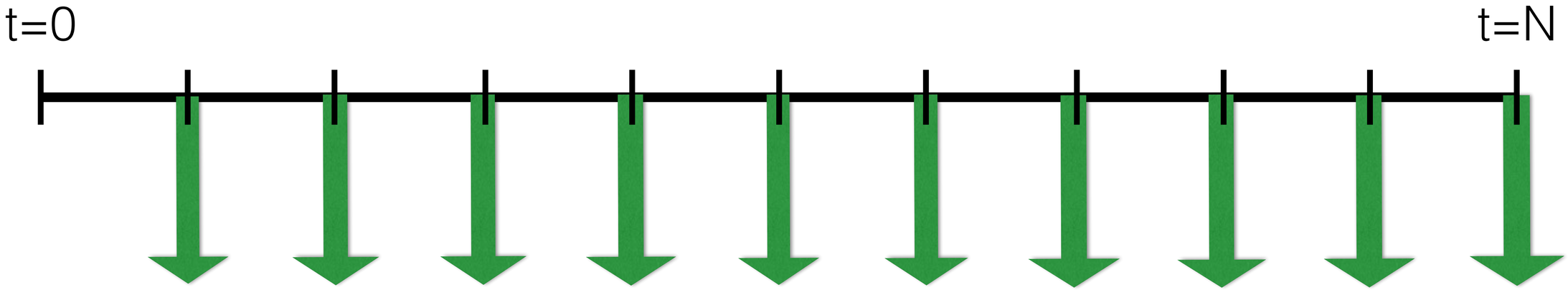
Annuity Due

Ordinary Annuity



Annuity Due

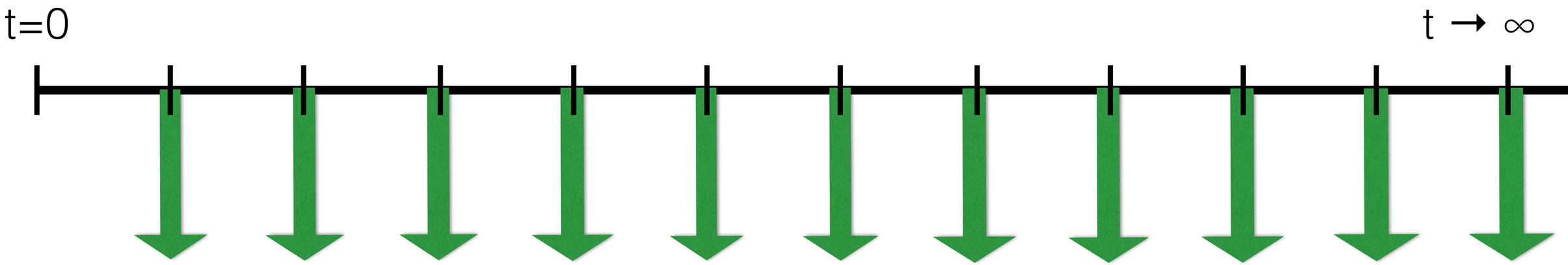
Ordinary Annuity



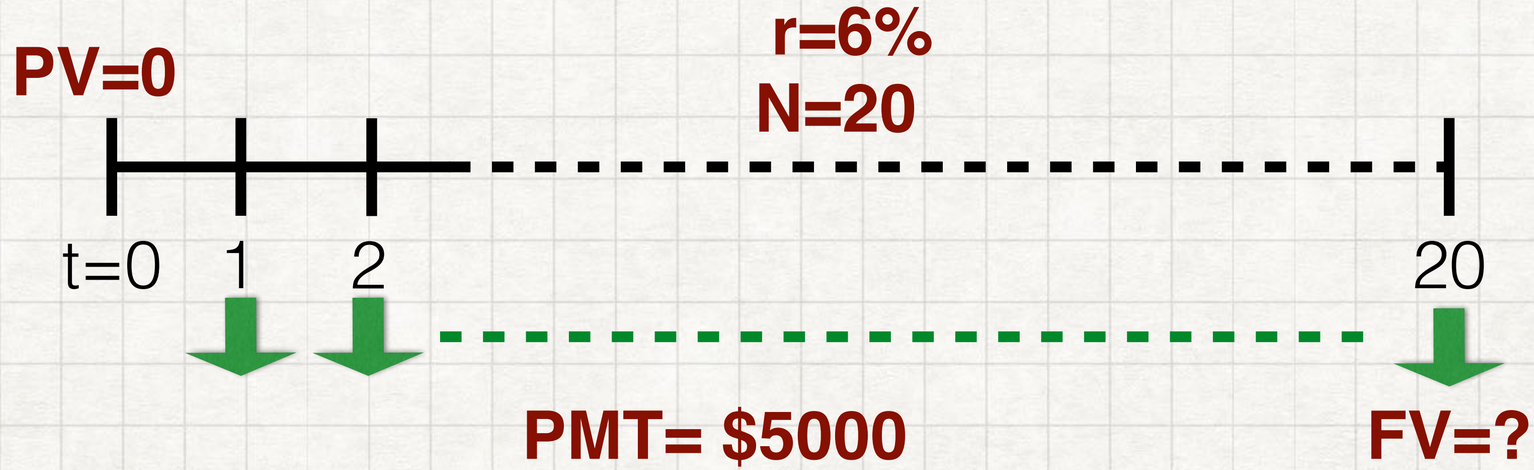
Annuity Due

Ordinary Annuity

Perpetuity



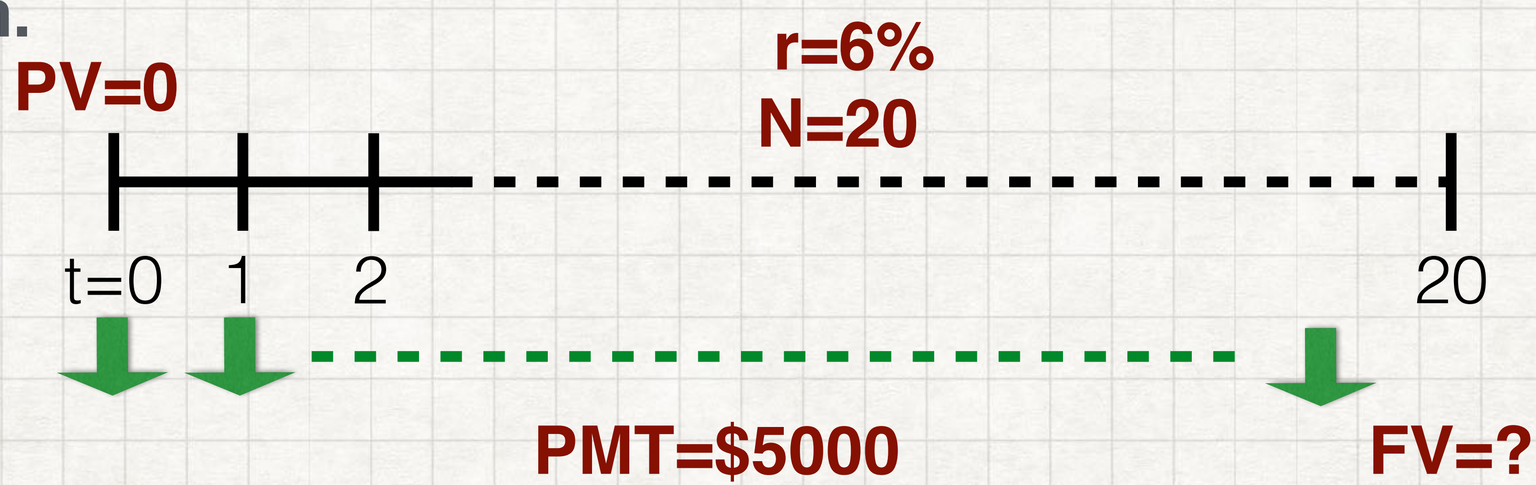
What is the future value of an **ordinary annuity** that pays $5000 per year for each of the next 20 years? Assume a discount rate of 6% per year.



CALC
END Mode

FV=$183,928

What is the future value of an **annuity due** that pays $5000 per year for each of the next 20 years? The investment is expected to earn a 6% rate of return.



2ND BGN → 2ND SET

CALC
BGN Mode

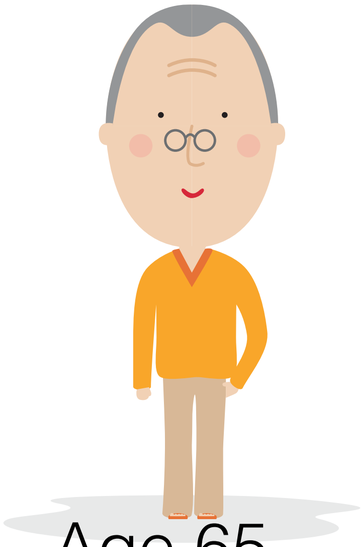
FV=$194,964

OR

CALC
END Mode

FV=$183,928 x 1.06

=$194,964



Age 60

Age 65

Age 75

Ordinary Annuity

$100,000 / yr

PREP nuggets

Annuities

1. Ordinary Annuities
2. Annuity Due
3. Perpetuities

Age 60 Age 65 Age 75

Ordinary Annuity
$100,000 / yr

4% discount rate

PV_{60} **PV_{65}**

N=10
I/Y=4%
PMT=$100,000
FV=$0

CALC
END Mode

PV=$811,090

PREP nuggets

Annuities

1. Ordinary Annuities
2. Annuity Due
3. Perpetuities

Age 60

Age 65

Age 75

Ordinary Annuity

$100,000 / yr

PV_{60} **PV_{65}**

4% discount rate

$811,090

$$PV = FV / (1+r)^N$$
$$= 811090 / 1.04^5$$
$$= \$666,657$$

PREP nuggets

Annuities

1. Ordinary Annuities 2. Annuity Due 3. Perpetuities

Calculator Practise

N=10
I/Y=4%
PMT=$100,000
FV=$0

PV_{65}=$811,090

STEP 1 - Calculate PV^{65}

2ND → CLR TVM → 10 → N → 4 → I/Y → 100000 → PMT → CPT → PV

Shortcut

÷ → 1.04 → y^x → 5 → =

**In AOS mode only. Check out video "Setting up your calculator" to find out more.*

STEP 2 - Store to Memory

STO → 1

STEP 3 - Calculate Discount Factor

1.04 → y^x → 5 → = → 1/X

STEP 4 - Multiply by stored PV^{65}

X → RCL → 1 → =

Age 60

Age 65

Age 75

Ordinary Annuity

$100,000 / yr

PV_{60} **PV_{65}**

4% discount rate

$811,090

$$PV = FV / (1+r)^N$$
$$= 811090 / 1.04^5$$
$$= \$666,657$$

PREP nuggets

Annuities

1. Ordinary Annuities 2. Annuity Due 3. Perpetuities

Age 60

Age 65

Perpetuity

$100,000 / yr

→ ∞

$$PV_{perp} = PMT / r$$

$$PV_{65} = \$100,000 / 0.04$$
$$= \$2.5M$$

Age 60

Age 65

Perpetuity

$100,000 / yr

→ ∞

PV_{60} PV_{65}

4% discount rate

$2.5M

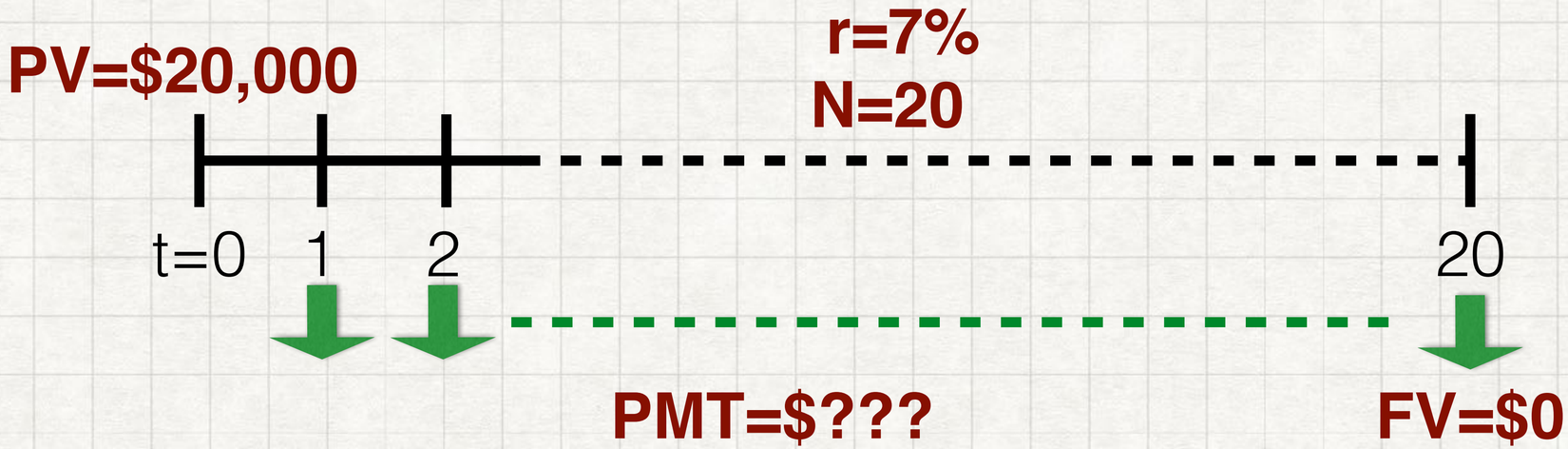
$$PV = FV / (1+r)^N$$
$$= 2500000 / 1.04^5$$
$$= \$2.055M$$

PREP nuggets

Annuities

1. Ordinary Annuities 2. Annuity Due 3. Perpetuities

Casey has an ordinary annuity that is worth $20,000 today. The expected annual return for this annuity is 7% per annum. He is expected to live for another 20 years. How much can he withdraw at the end of each year such that the annuity can last him for the full 20 years?



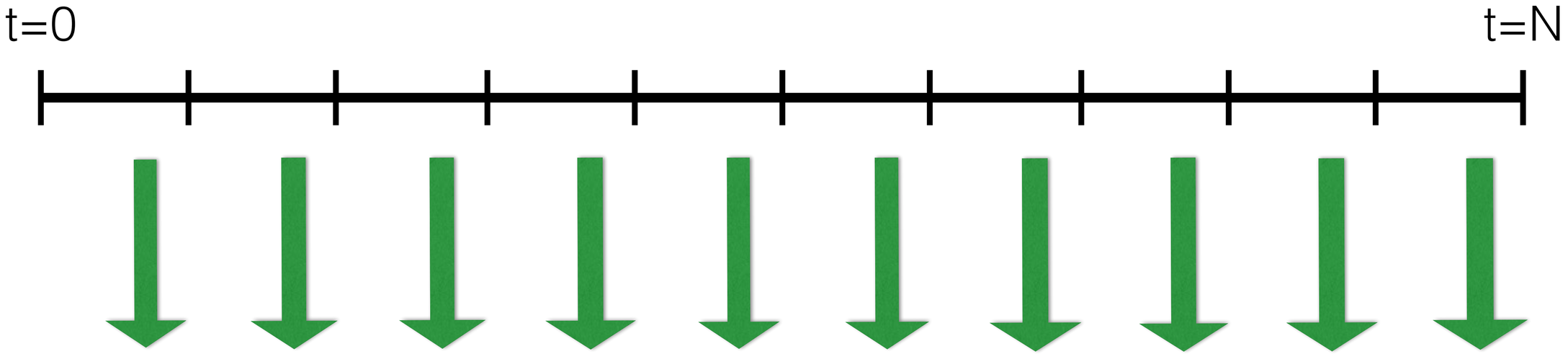
CALC
END Mode

PMT=$1888

Annuity Due

Ordinary Annuity

Perpetuity

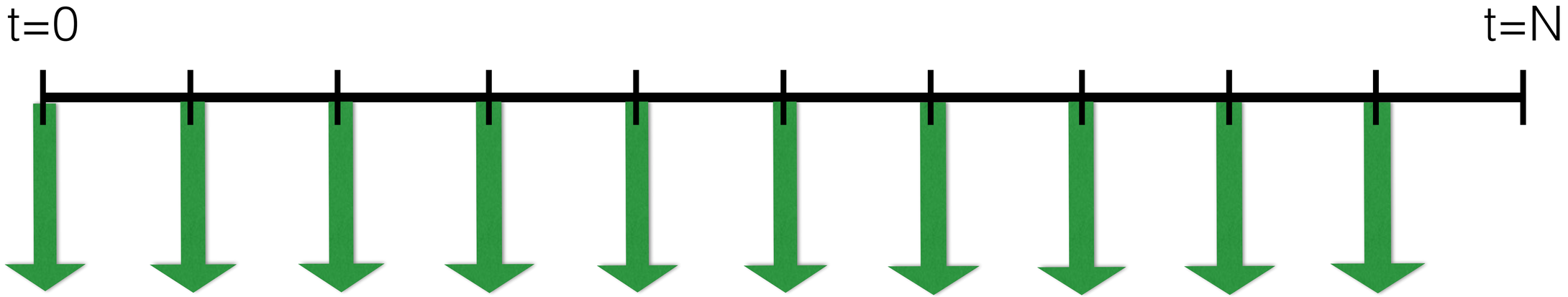


PREP nuggets

Annuity Due

Ordinary Annuity

Perpetuity



PREP nuggets

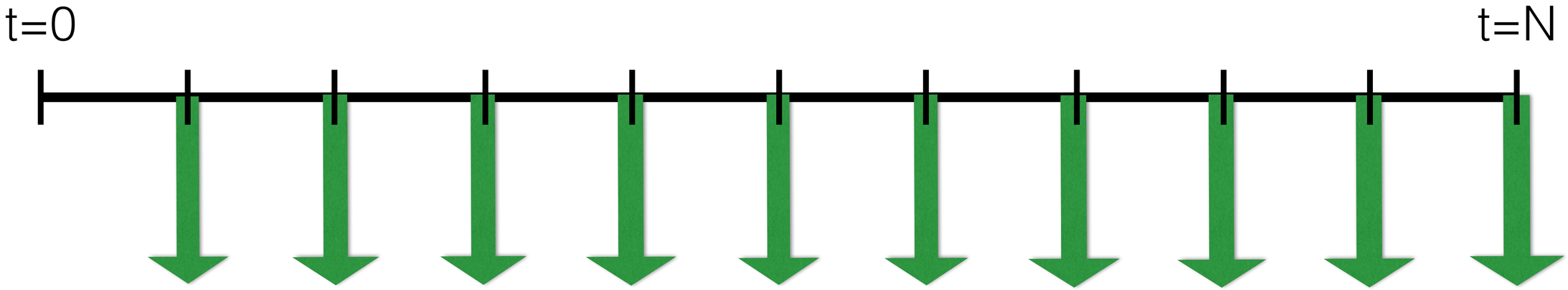
Annuities

1. Ordinary Annuities
2. Annuity Due
3. Perpetuities

Annuity Due

Ordinary Annuity

Perpetuity



PREP nuggets

Annuities

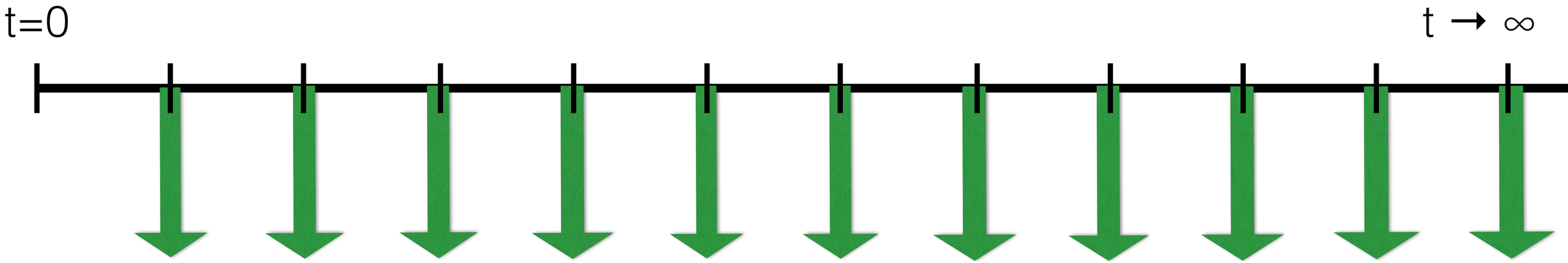
1. Ordinary Annuities
2. Annuity Due
3. Perpetuities

Annuity Due

Ordinary Annuity

Perpetuity

$$PV_{perp} = PMT / r$$




PREP
nuggets