
Lecture 1

MTH 101

Tuesdays- Lecture

Thursdays- Recitation ... Snapshot/Lab

Mondays - Homework/Survey Due

Rachael Lund

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Office: C134WH (Wells Hall)

**Office Hours: Monday 1:45-2:45pm, Thursday 4-5 pm +
by appointment**

Important Websites

mth101.com

all information for the course is found here

math.msu.edu/student

homework system, grades, schedule information

[MSU google apps](#)

Google sheets-useful for labs/project

RCPD VISAs+

you are REQUIRED to meet with me if you plan on using accommodations for this course

Important Dates

Monday, Jan 13 th

- Pre-course survey due Jan 13 th

Wednesday, Feb 26 th

- Midterm Exam at 7:30pm.
- Rooms TBD

Monday, April 28 th

- Final Exam 10am - 12pm.
- Rooms TBD

Poll Everywhere

pollev.com/msumath

Check MSU Email for support@polleverywhere.com

Hi Lund,

Math MSU has registered you as a participant on their Poll Everywhere account. Please reset your Poll Everywhere password to complete registration. First, click the link below or copy and paste it into your browser's address bar. Next, type the following email address into the email field. Finally, select "Reset password".

Use rlund@msu.edu to reset your Poll Everywhere password.

https://urldefense.proofpoint.com/v2/url?u=https-3A_www.polleverywhere.com_password-5Fresets_new&d=DwlCaQ&c=nE_W8dFE-shTxStwXtp0A&r=eZXGp5sNTToLHrrslQOoDHg&m=qI4sdYVD65IT6iehe_0GuMZBUOUf2ViBz8PI9Pn1feQ&s=DqG9Un9WV_Reo_jBjn2vsVD_R-beAO5WiRKn5nGEndl&e=



Poll Everywhere

urldefense.proofpoint.com

step 1-initial set up, log in with msu email

Reset your password

Make sure the email you entered is correct. You'll receive instructions to reset your password.

Email
rlund@msu.edu

Reset password

Cancel

step 2 - check email !

Poll Everywhere <no-reply@polleverywhere.com>

to me ▾

Hi,

To reset your Poll Everywhere password, use the following link:

https://www.polleverywhere.com/password_reset/OtSNOMf56ftcKjvfwQVWd

Cheers,

The Poll Everywhere team

step 3- change password

step 4 - log in again

Log in

Email or username

Next

 Sign in with Google

[Forgot your password?](#)
Need an account? [Create one now](#)

from now on.... *pollev.com/msumath*

You need an account before you can register with Math MSU

Log in to Poll Everywhere

Next

 Sign in with Google

[Reset password](#)

New to Poll Everywhere?

Create an account

PollEv

L1-Q1

Is your recitation at:

- A. 8:30am
- B. 10:20 am
- C. 1:00 pm
- D. 2:40 pm

Absolute vs Relative Measures

Goals for Today:

- Distinguish between absolute and relative measures
- Calculate percent change and absolute change

L1-Q2 Which country is the most crowded??

Country	Total Population (2018)
United States (A)	327,000,000
Singapore (B)	5,790,000
Mexico (C)	131,000,000
Mauritius (D)	1,270,000

How crowded is a country?

What should we look at?

Country	Total Population	Population Density (people per square kilometer of land area)
United States	327,000,000	35.6
Singapore	5,790,000	7920
Mexico	131,000,000	66.4
Mauritius	1,270,000	623

Absolute vs Relative Measures

Absolute Measure: total population

Relative Measure: population density, people per square kilometer of land area

Where is it best to have a baby?

What should we look at?

Country	Number of Child Deaths (number of children dying before 5 years old)
Canada	1820
Nepal	19,900
United States	24,900
China	182,000

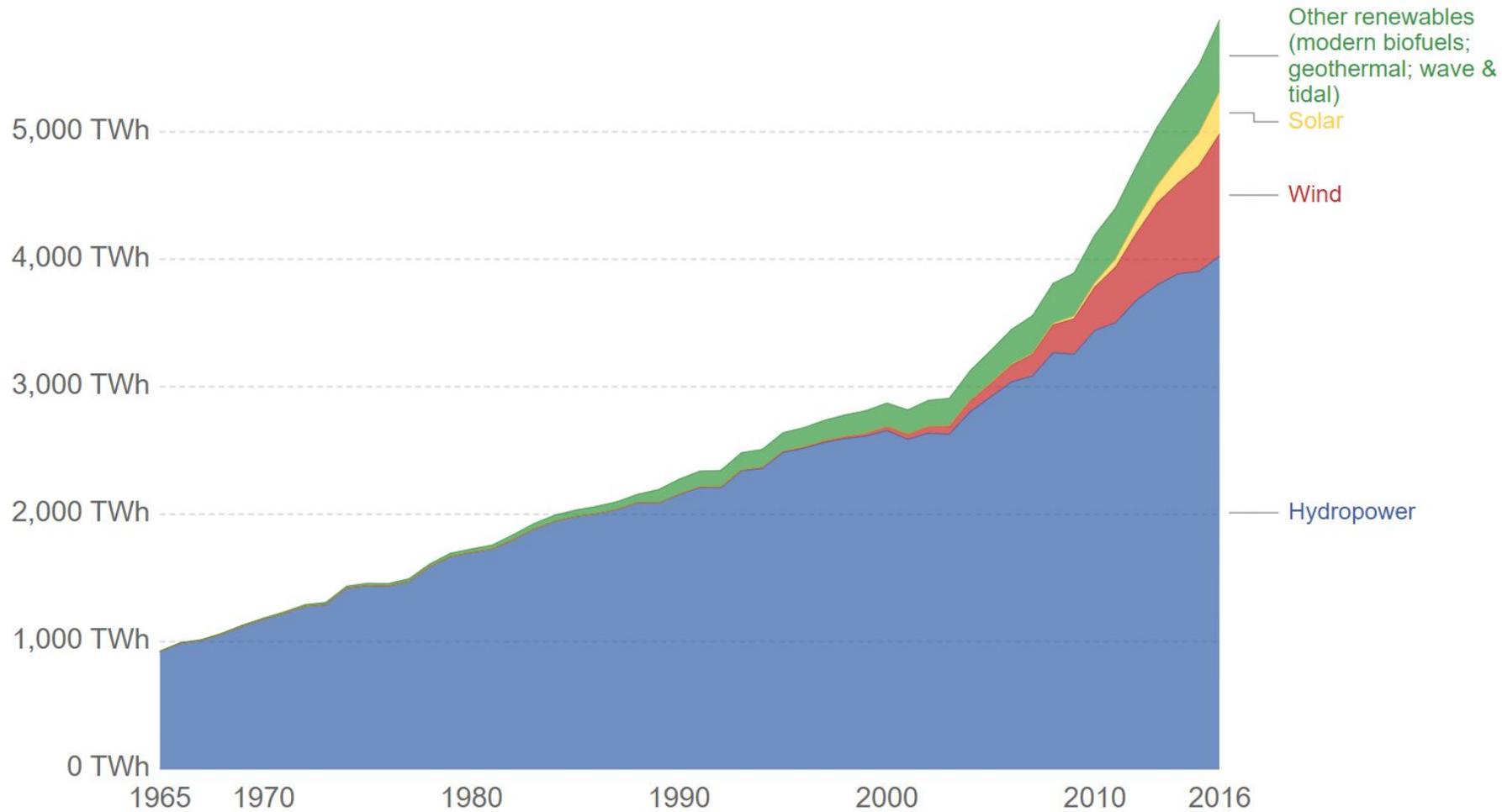
Where is it best to have a baby?

What should we look at?

Country	Number of Child Deaths (number of children dying before 5 years old)	Child Mortality Rate, 0-5 years old dying per 1000 born
Canada	1820	4.82
Nepal	19,900	31.4
United States	24,900	6.06
China	182,000	9.95

Modern renewable energy consumption, World

Total renewable energy consumption, measured in terawatt-hours (TWh) per year. This data includes all renewable energy sources with the exclusion of traditional biomass.



Source: BP Statistical Review of Global Energy

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⇌ Change country Relative

CHART

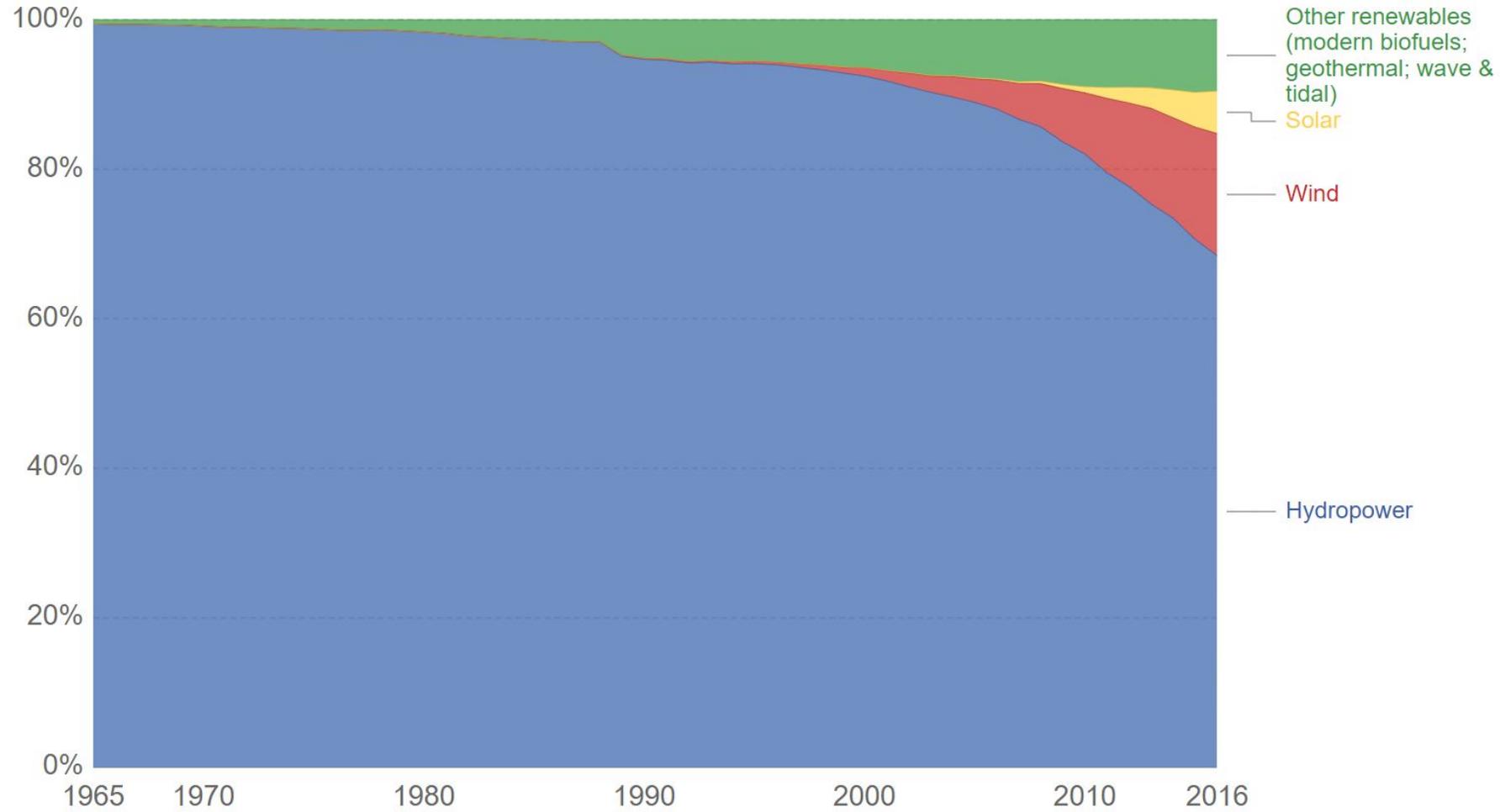
DATA

SOURCES



Modern renewable energy consumption, World

Total renewable energy consumption, measured in terawatt-hours (TWh) per year. This data includes all renewable energy sources with the exclusion of traditional biomass.



Source: BP Statistical Review of Global Energy

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↔ Change country Relative

CHART

DATA

SOURCES



L1-Q3

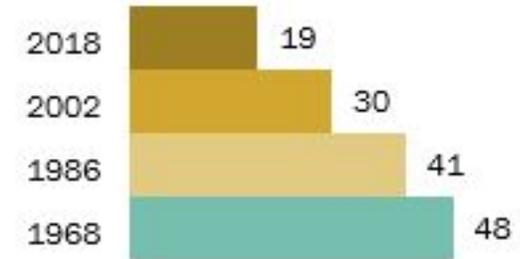
Describe the number 48 in the chart.

- A. Forty-eight civilians aged 15-17 years old were employed in 1968.
- B. Forty-eight percent of civilians aged 15-17 years old were employed in 1968.
- C. Forty-eight percent of civilians were employed in 1968.
- D. Forty-eight percent of millennials were employed in 1968.

Post-Millennials less likely to work than older generations when they were young

% of civilians who were employed during the prior year

15- to 17-year-olds



18- to 21-year-olds



Source: Pew Research Center analysis of 1968, 1986, 2002 and 2018 Current Population Survey Annual Social and Economic Supplement (IPUMS).

"Early Benchmarks Show Post-Millennials on Track to Be Most Diverse, Best-Educated Generation Yet"

PEW RESEARCH CENTER

L1-Q4

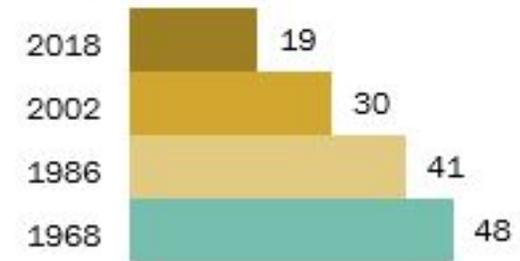
Choose the true statement(s) according to the graph.

- A. The percent of civilians age 18-21 years old employed in 1968 is higher than the percent employed in 2018.
- B. The number of civilians age 18-21 years old employed in 1968 is higher than the number employed in 2018.
- C. More 18-21 year olds are employed in each given year than 15-17 year olds.
- D. The percent of 18-21 year olds employed in each year given is higher than the percent of 15-17 year olds.

Post-Millennials less likely to work than older generations when they were young

% of civilians who were employed during the prior year

15- to 17-year-olds



18- to 21-year-olds



Source: Pew Research Center analysis of 1968, 1986, 2002 and 2018 Current Population Survey Annual Social and Economic Supplement (IPUMS).

"Early Benchmarks Show Post-Millennials on Track to Be Most Diverse, Best-Educated Generation Yet"

PEW RESEARCH CENTER

Important Note

We cannot say that 58% in 2018 is more total 18-21 year olds than 80% in 1968.

The percent of civilians 18-21 years old is higher in 1968 than in 2018, but we can't compare **number** civilians. We don't know the total population in either year of 18-21 year olds.

Types of Change

Absolute Change: describes the actual increase or decrease from a reference value to the new value

Relative Change: the size of the absolute change in comparison to the reference value (and can be expressed as a percentage)

Relative change = $(\text{new value} - \text{reference value}) / \text{reference value} \times 100\%$

Relative can also mean amount PER #

WHY THE NUMBERS MATTER

RELATIVE RISK

**"New wonder drug
reduces heart
attack risk 50%"**

ABSOLUTE RISK

**"New wonder drug
reduced heart attacks
from from 2 per 100
to 1 per 100"**

The **absolute risk** is more useful at conveying the true impact of an intervention, yet is often under-reported in the research and the news.



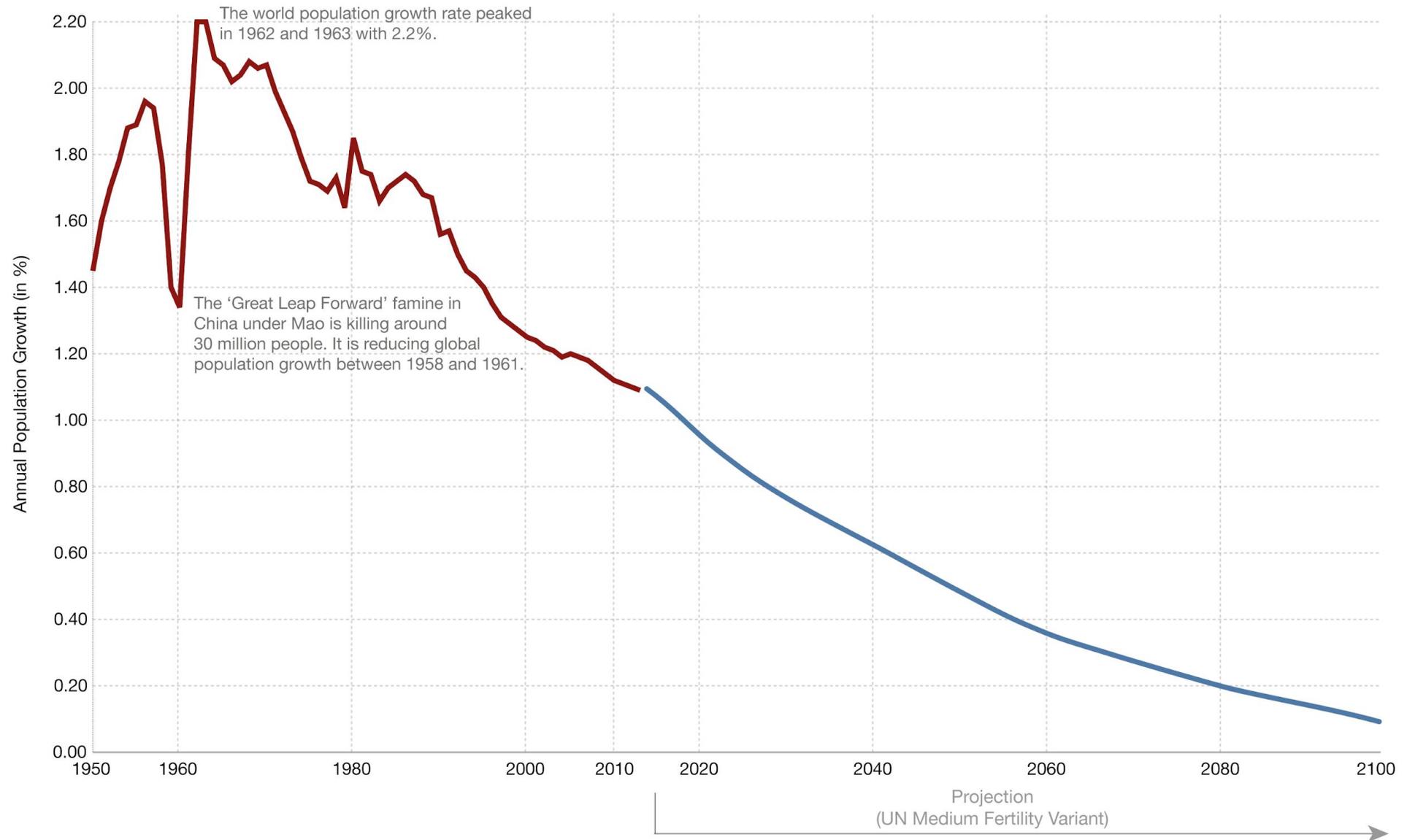
HEALTHNEWSREVIEW
YOUR HEALTH NEWS WATCHDOG

L1-Q5

A store has a big sale - all items are 50% off. A week later the store has additional 50% off on the already reduced prices. Which of the following statements are true?

- A. All items in the store are free.
- B. We cannot determine the discount rate of a given item, as we need to know the original price of the item.
- C. We cannot determine the sale price of a given item, unless we know the original price of the item.
- D. All items are 75% off.
- E. All items are 25% of their original price.

Annual world population growth rate (1950-2100)



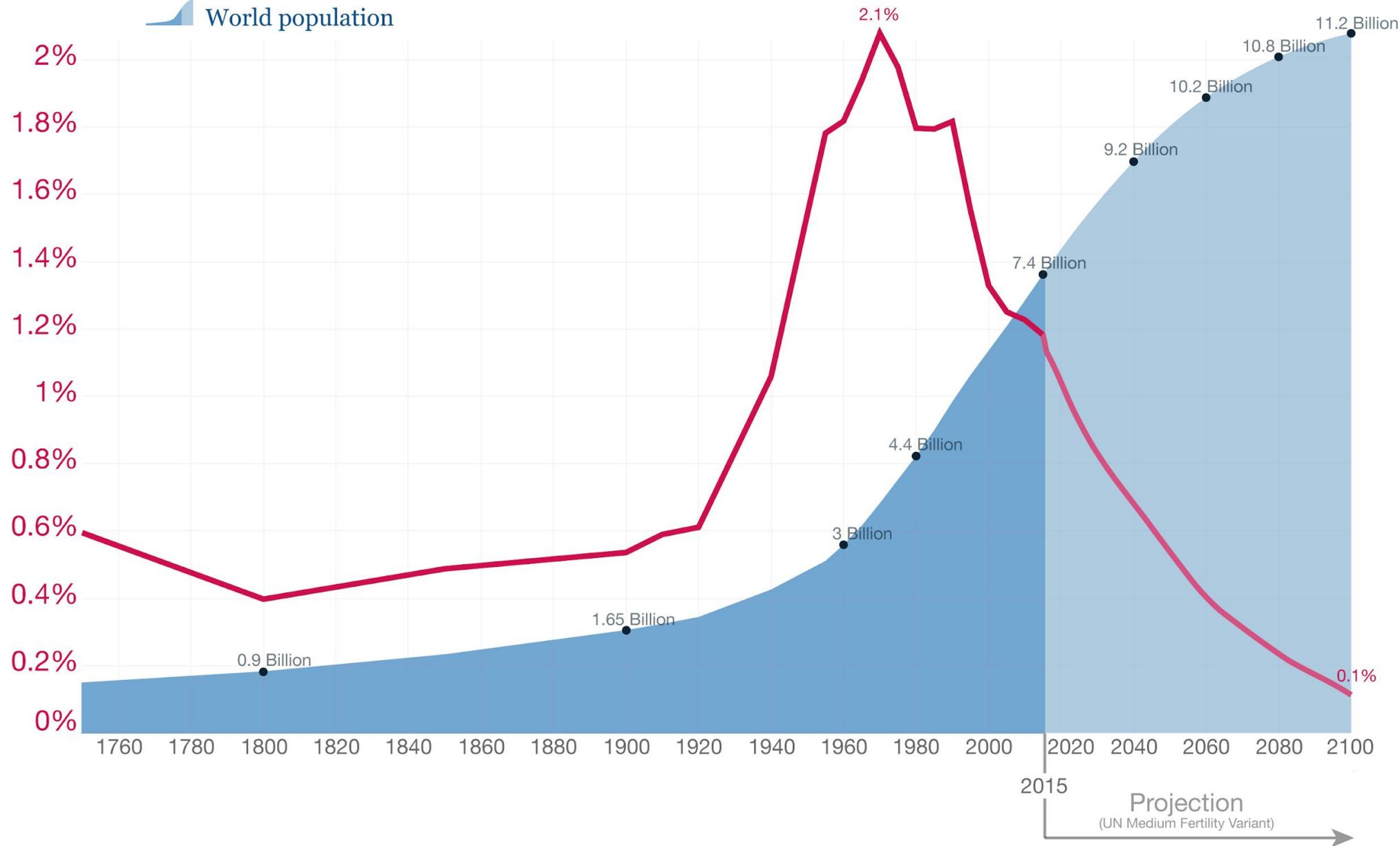
L1-Q6

What can we say about the world population in 2010?

- A. The world population is decreasing in 2010.
- B. The world population is increasing 2010, but at a slower rate than in previous years.
- C. The graph does not give enough information to determine if the world population increasing or decreasing in 2010.

World population growth, 1750-2100

Annual growth rate of the world population
World population



Data sources: Up to 2015 OurWorldInData series based on UN and HYDE. Projections for 2015 to 2100: UN Population Division (2015) – Medium Variant. The data visualization is taken from [OurWorldinData.org](https://ourworldindata.org). There you find the raw data and more visualizations on this topic.

$$\text{Percent Change} = \frac{\text{New} - \text{Old}}{\text{Old}} * 100\%$$

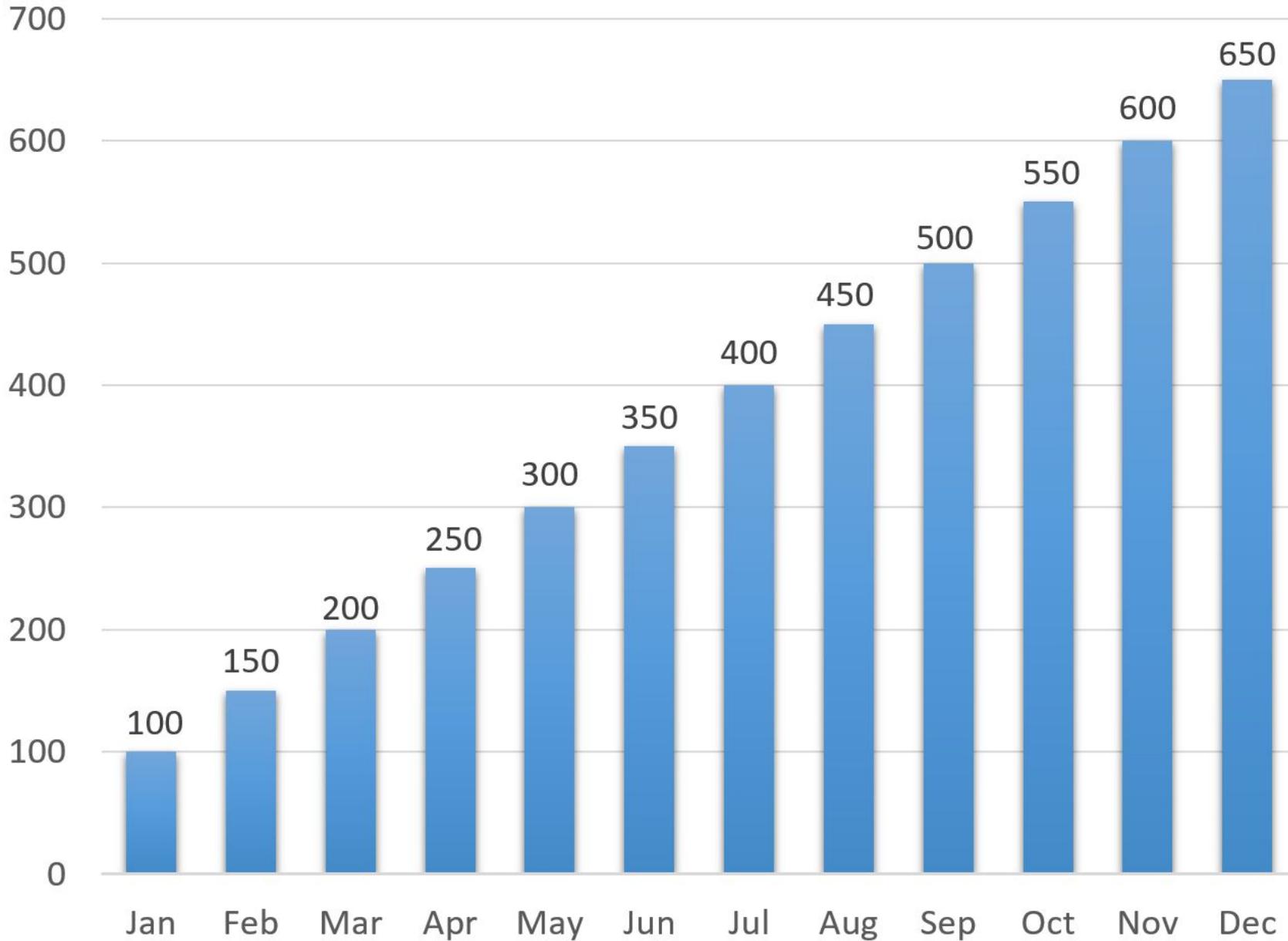
Example

A backpack usually costs \$70, but is on sale for \$30. What is the percent change in the price?

Example

Ana makes \$45,000 and gets a 2.5% raise. What is her new salary?

Constant Change

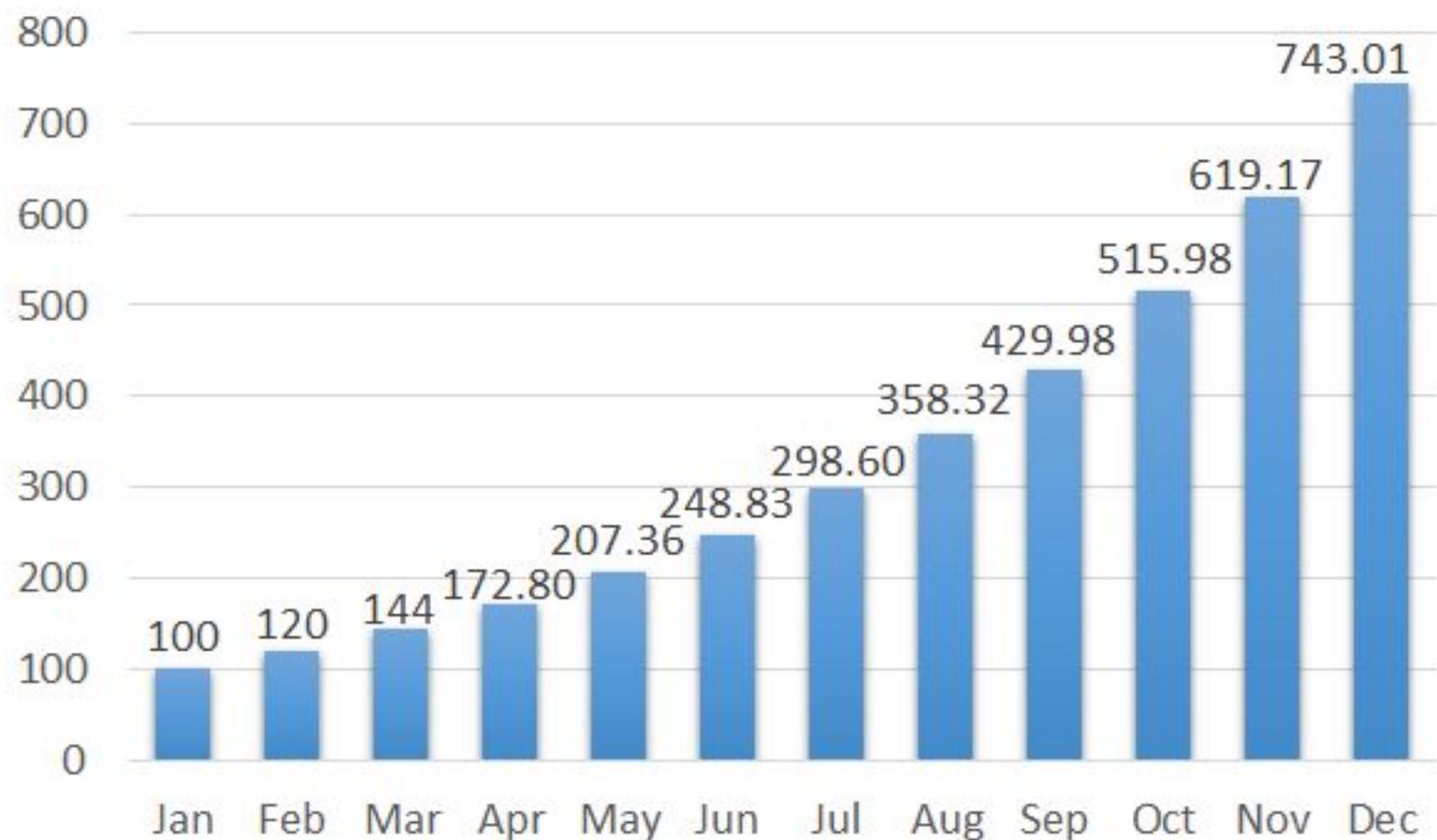


Month	Savings
Jan	100
Feb	150
Mar	200
Apr	250
May	300
Jun	350
Jul	400
Aug	450
Sep	500
Oct	550
Nov	600
Dec	650

Based on the graph above, which of the following statements are true?

- A. Each month her savings increases by a constant amount.
- B. Each month her savings increases by a constant percentage.
- C. The contribution to her savings increases each month.
- D. The percent change of her savings decreases each month.

Constant Percent Change



Month	Investment amount
Jan	100
Feb	120
Mar	144
Apr	172.80
May	207.36
Jun	248.83
Jul	298.60
Aug	358.32
Sep	429.98
Oct	515.98
Nov	619.17
Dec	743.01

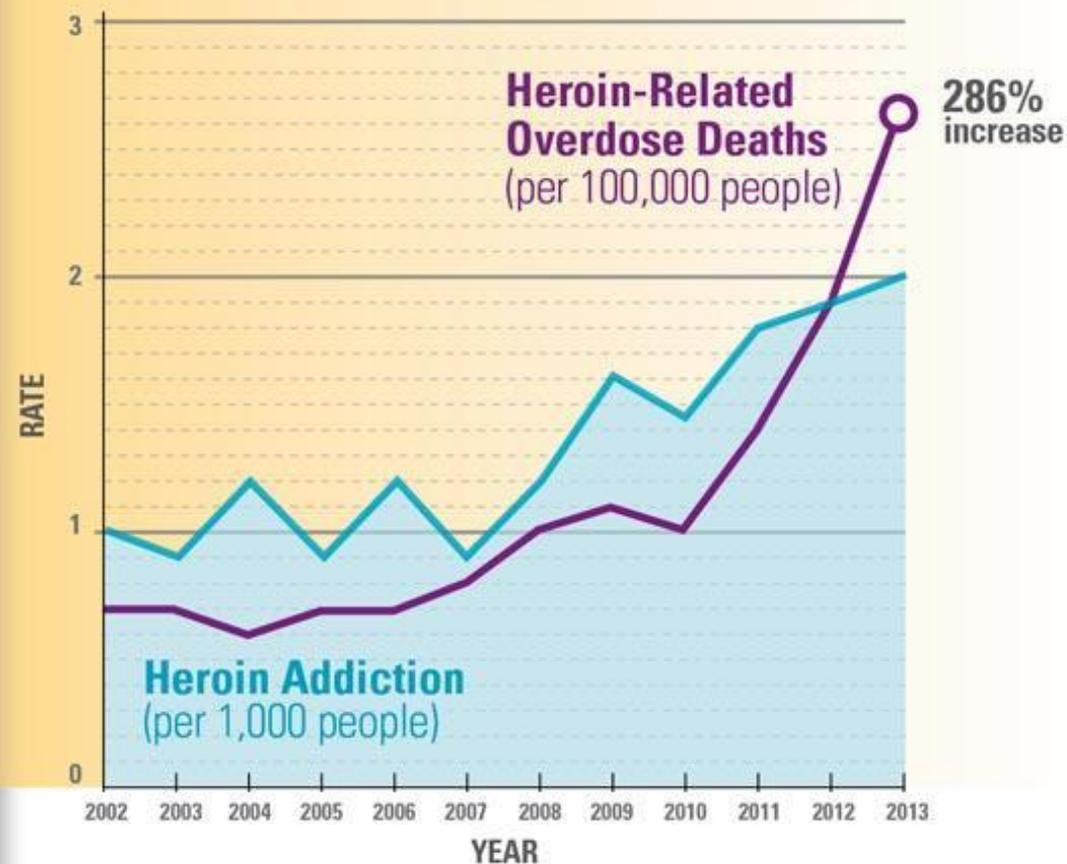
Which of the following statements are true?

- A. Each month his savings increases by a constant amount.
- B. Each month his savings increases by a constant percentage.
- C. The contribution to his savings increases each month.
- D. The percent change of his savings increases each month.

Heroin Use Has INCREASED Among Most Demographic Groups

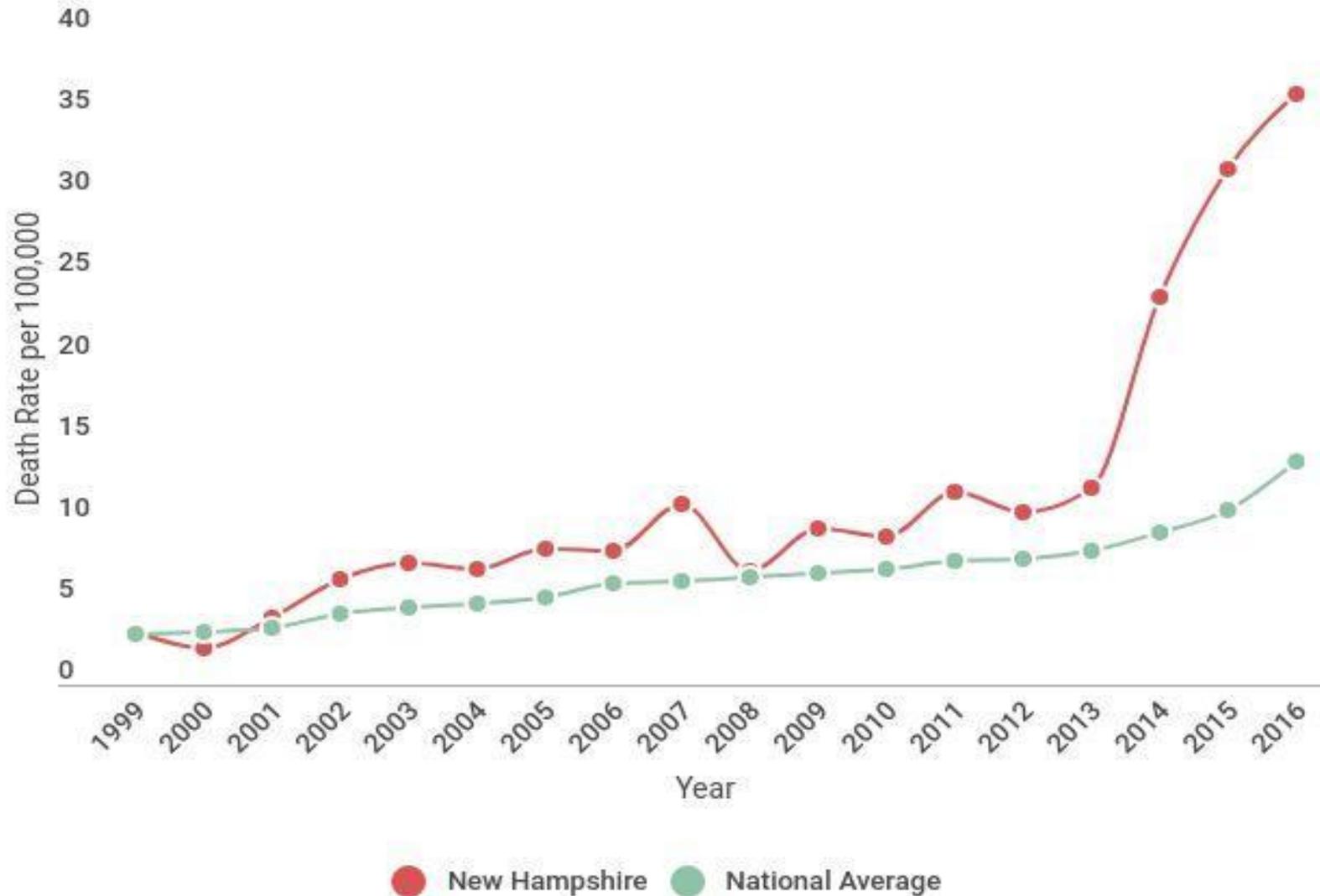
	2002-2004*	2011-2013*	% CHANGE
SEX			
Male	2.4	3.6	50%
Female	0.8	1.6	100%
AGE, YEARS			
12-17	1.8	1.6	--
18-25	3.5	7.3	109%
26 or older	1.2	1.9	58%
RACE/ETHNICITY			
Non-Hispanic white	1.4	3	114%
Other	2	1.7	--
ANNUAL HOUSEHOLD INCOME			
Less than \$20,000	3.4	5.5	62%
\$20,000-\$49,999	1.3	2.3	77%
\$50,000 or more	1	1.6	60%
HEALTH INSURANCE COVERAGE			
None	4.2	6.7	60%
Medicaid	4.3	4.7	--
Private or other	0.8	1.3	63%

Heroin Addiction and Overdose Deaths are Climbing



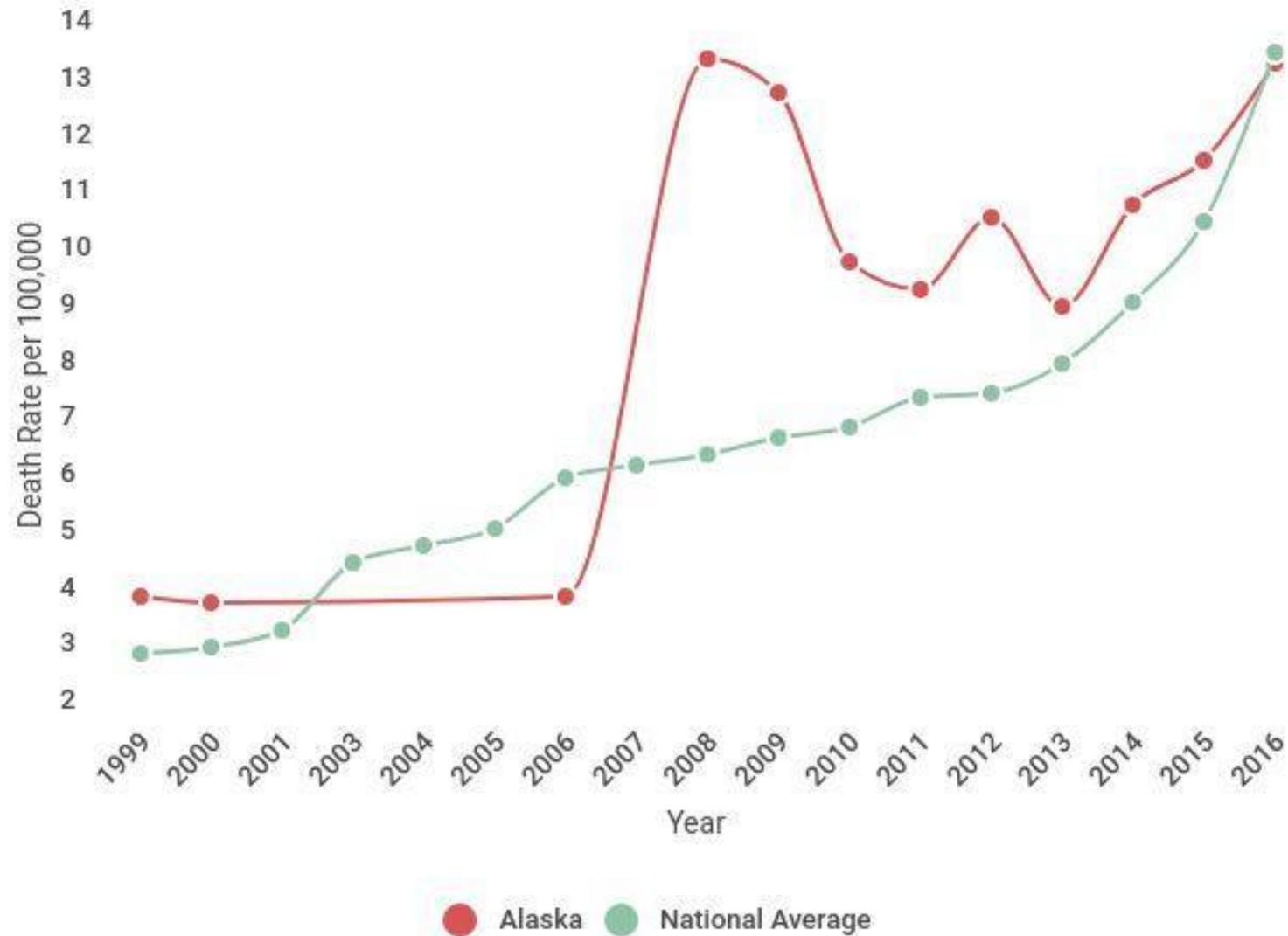
SOURCES: National Survey on Drug Use and Health (NSDUH), 2002-2013.
National Vital Statistics System, 2002-2013.

Opioid Overdose Deaths



- **Opioid overdose death rate (age-adjusted):** 36.3 per 100,000
- **10-year percent change:** 343% increase
- **Most impacted age group:** 35-44 years
- **Most impacted county:** Rockingham County

Opioid Overdose Deaths



- **Opioid overdose death rate (age-adjusted):** 13.5 per 100,000
- **10-year percent change:** 229% increase
- **Most impacted age group:** Unknown
- **Most impacted county:** Unknown

THANK YOU

Have a great day and come talk to me if you have any questions about the course!!

Please take laptop to recitation on Thursday!