Math 114

Module 3

Prof. Volk

Spring 2025

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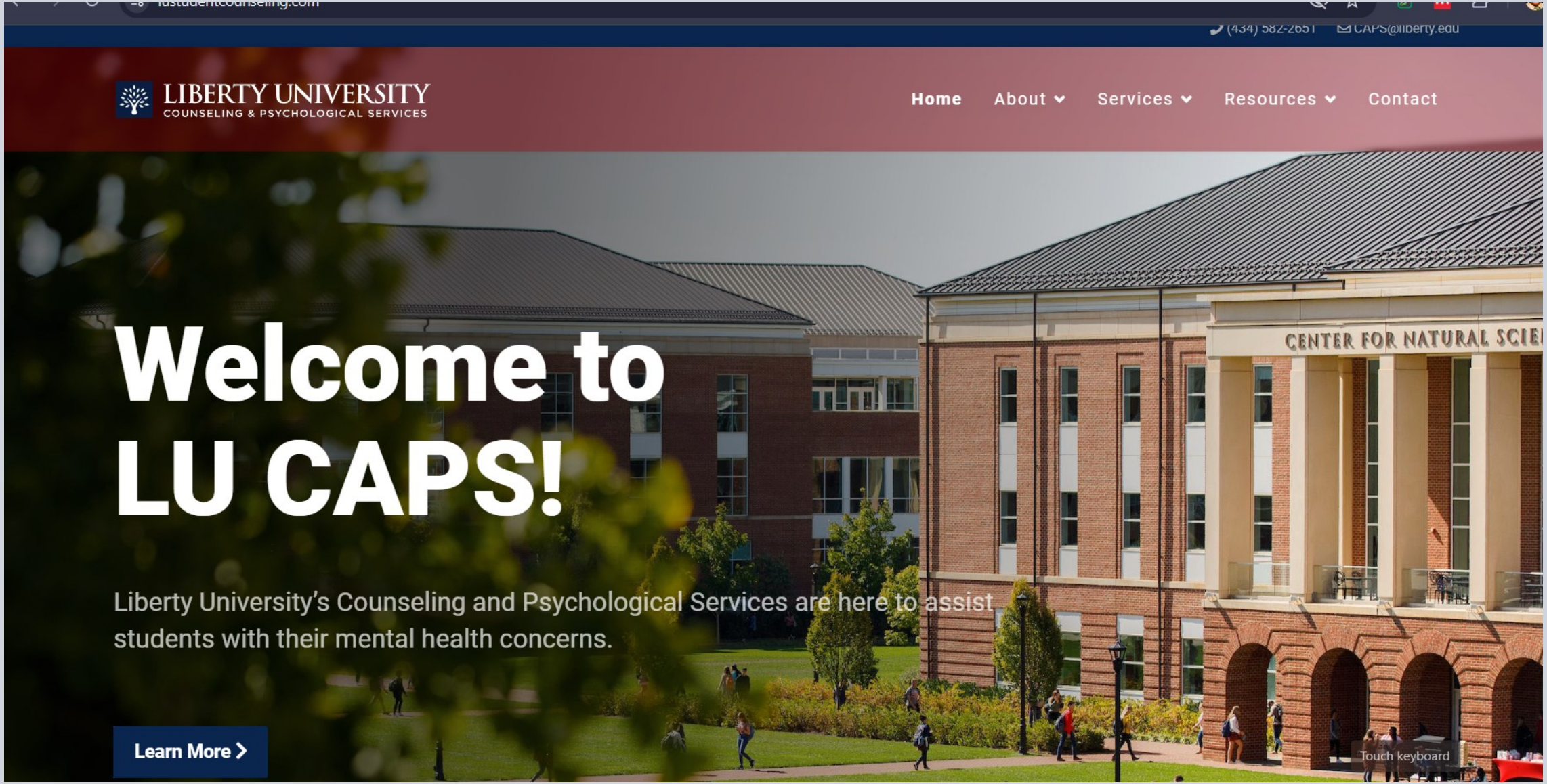
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CAPS@liberty.edu
LIBERTY UNIVERSITY
COUNSELING & PSYCHOLOGICAL SERVICES
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Welcome to
LU CAPS!
Liberty University's Counseling and Psychological Services are here to assist students with their mental health concerns.
Learn More
CENTER FOR NATURAL SCIE
Touch keyboard

Let's Talk

Let's Talk is a drop-in service that provides easy access to informal, confidential consultations with counselors from Counseling & Psychological Services. Our counselors hold walk-in hours on campus during the week to listen to your

"Let's Talk" Schedule

Let's Talk consultations are available on the days and times listed below:

Virtual Meetings:

Schedule Meeting

In Person: M-F

12:30pm – 2pm
Andrew Ashcroft or Louis Alvey
DH3122A

Services

Mental Health Screening

Let's Talk

Individual Counseling

Individual Counseling

Plan for your first visit when you have approximately two hours for an appointment – the entire process may take this long depending on the number of students being served. To access services for the first time, a student should visit Counseling & Psychological Services during our walk-in hours:

- Monday, Tuesday, and Thursday: 9 a.m. – 3 p.m.
- Wednesday and Friday: 12 p.m. – 3 p.m.

Services

Mental Health Screening

Let's Talk

Individual Counseling

Group Counseling

Workshops

Educational Events

Contact

(434) 582-2651
(434) 582-3904 (fax)

Email

Green Hall, Room 1830

**For emergency assistance after office hours, please contact your Resident Director or call the LUPD emergency line at (434) 592-3911.*

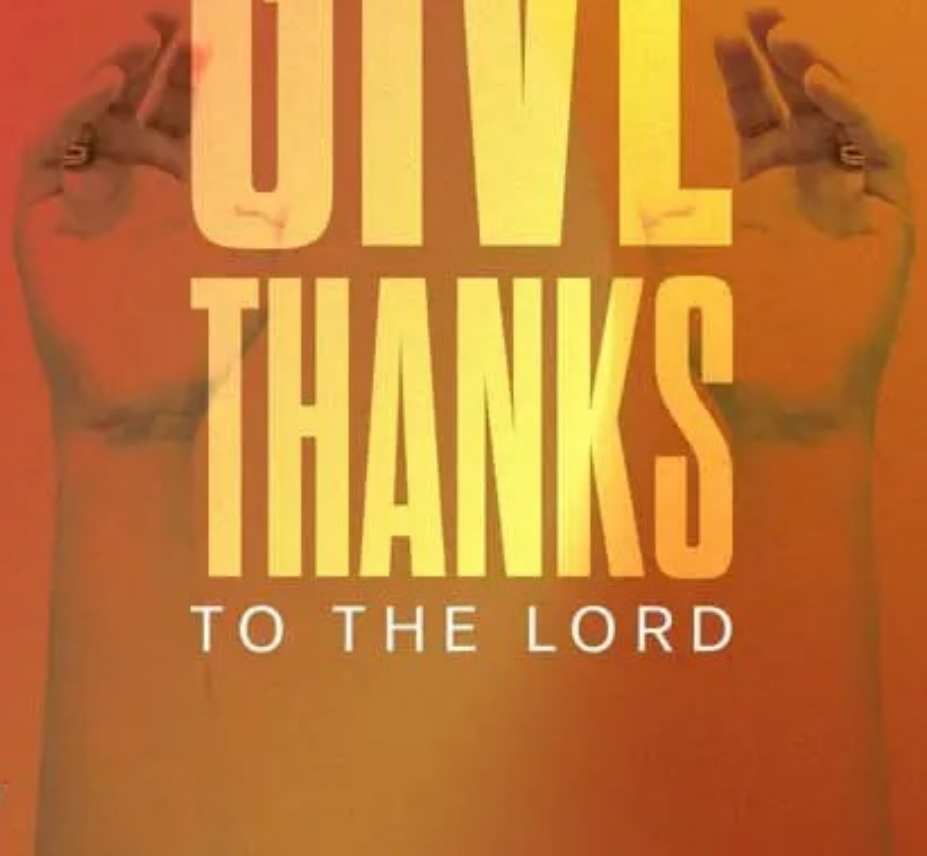
9 : 1

PSALM

I WILL

GIVE THANKS

TO THE LORD



PSALM

9 : 1

1955


McDonald's
HAMBURGER 15¢
CHEESEBURGER 19¢
FRENCH FRIES 10¢
MILK 10¢
MILK SHAKE Chocolate Strawberry Vanilla 20¢
ROOT BEER 10¢
ORANGEADE 10¢
COCA COLA 10¢
COFFEE 10¢
U.S. GOVERNMENT
INSPECTED


¼ POUNDER .70
¼ POUNDER .60
BIG MAC .65
FILET-O-FISH .48
CHEESEBURGER .33
HAMBURGER .28
MILK .20
LARGE FRENCH FRIES .46
FRENCH FRIES .26
HOT APPLE PIE .26
COFFEE .15
HOT CHOCOLATE .15
SHAKES .35
COCA COLA - ROOTBEER - ORANGEADE 15 & .20
TRIPPLE RIPPLE ICE CREAM CONE .20

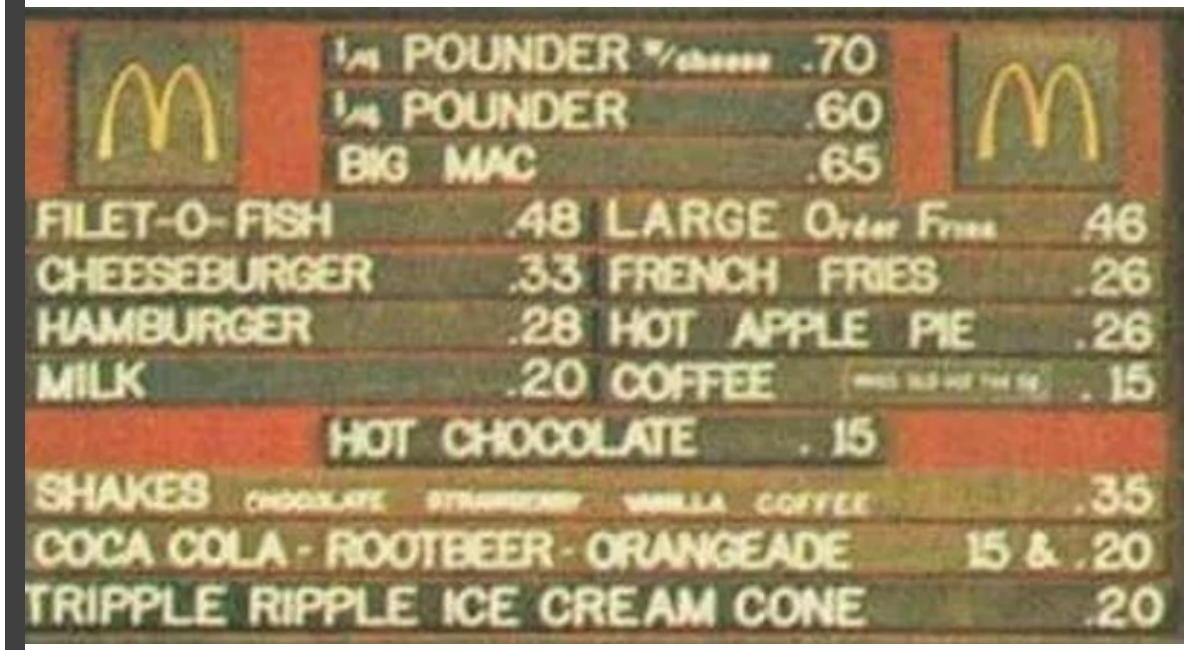
1973

Percent Change

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

If the result is positive, it is an increase.

If the result is negative, it is a decrease.



Percent Change

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

If the result is positive, it is an increase.
If the result is negative, it is a decrease.

How much did the items increase in price from1955 and 1973 in absolute and relative terms?

Absolute = difference
Relative = percent change

What to do in lecture?

Show up

Take notes

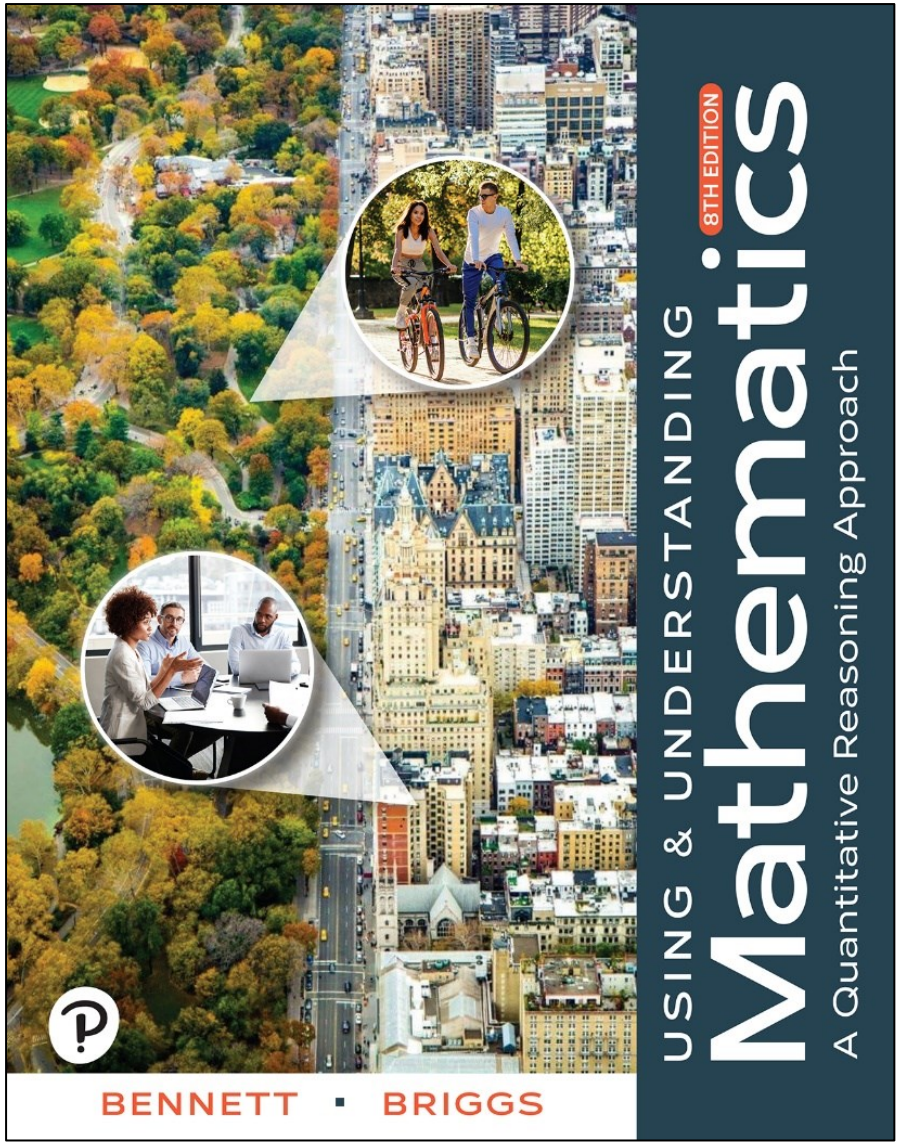
Key formulas

New words

Hints and shortcuts

Answer questions

Make Progress



This Week's Reading

Chapter 3

(Sections A & B)

Percentages & Sci. Notation

Homework 3: 20 Questions

Due Sunday 11:59 pm

Questions 1	• Decide if statements involving percentages make sense.
Question 2-4	• Convert between fractions, decimals, and percentages.
Questions 5 & 6	• Express ratios in direct form and in percentages.
Questions 7	• Express fractions as percentages.
Questions 8-11	• Solve percent increase and decrease problems.
Questions 12	• Compare absolute and relative changes.
Question 13	• Solve applications involving the uses and abuses of percentages.
Question 14 & 15	• Decide if statements involving percentages make sense.
Question 16	• Define and explain terms related to scientific notation, estimation, comparison, and scaling.
Question 17 & 18	• Decide if statements containing numbers make sense.
Questions 19	• Estimate quantities using scientific notation.
Question 20	• Compare quantities to put numbers in perspective.

Quiz 3: 10 Questions

Due Monday
11:59 pm

Questions 1 & 2	• Solve percent increase and decrease problems.
Questions 3	• Decide if statements involving percentages make sense.
Question 4	• Convert between fractions, decimals, and percentages.
Questions 5	• Express ratios in direct form and in percentages.
Questions 6	• Express fractions as percentages.
Questions 7	• Compare absolute and relative changes.
Questions 8 & 9	• Estimate quantities using scientific notation.
Question 10	• Compare quantities to put numbers in perspective.

Module 3: **Learning Outcomes**

Solve percent increase and decrease problems.

Convert between fractions, decimals, ratios, and percentages.

Compare absolute and relative changes.

Interpret numbers in percentages and scientific notation.

Unit 3A

Uses and Abuses
of Percentages

Three Ways of Using Percentages

- As fractions:

  A total of 13,000 news room employees, 2.6% of the news room work force, lost their jobs.

- To describe change:

  A company's stock fell 15% last week, to $44.25.

- For comparisons:

  The new battery lasts 175% longer than the older one, but costs 10% less.

Example: Presidential Survey

An opinion poll finds that 35% of 1069 people surveyed said that the President is doing a good job. How many said the President is doing a good job?

Solution

Because *of* indicates multiplication, 35% of the 1069 respondents is

$$35\% \times 1069 = 0.35 \times 1069 = 374.15 \approx 374$$

About 374 people said the President is doing a good job. We rounded the answer to 374 to obtain a whole number of people.

Absolute and Relative Change

- The **absolute change** describes the actual increase or decrease from a reference value (starting number) to a new value:

absolute change = new value – reference value

- The **relative change** is a fraction that describes the size of the absolute change in comparison to the reference value:

$$\text{relative change} = \frac{\text{new value} - \text{reference value}}{\text{reference value}} \times 100\%$$

Example: Stock Price Rise

During a 6-month period, Lunar Industry's stock doubled in price from $7 to $14. What were the absolute and relative changes in the stock price?

absolute change = new value – reference value

= $14 – $7 = $7

$$\text{relative change} = \frac{\text{new value} - \text{reference value}}{\text{reference value}} \times 100\%$$

$$= \frac{\$14 - \$7}{\$7} \times 100\% = 100\%$$

Example: Depreciating a Computer (1 of 2)

You bought a new laptop computer three years ago for $1000. Today, it is worth only $300. Describe the absolute and relative change in the laptop's value.

Solution The reference value is the original price of $1000, and the new value is its current worth of $300. The absolute change in the computer's value is

$$\text{absolute change} = \text{new value} - \text{reference value}$$

$$= \$300 - \$1000 = -\$700$$

Example: Depreciating a Computer (2 of 2)

The negative sign tells us that the computer's current worth is \$700 *less than* the price you paid three years ago. The relative change is

$$\text{rel chg} = \frac{\text{new value} - \text{reference value}}{\text{reference value}} \times 100\%$$

$$= \frac{\$300 - \$1000}{\$1000} \times 100\% = -70\%$$

Again, the negative sign tells us that the laptop is now worth 70% *less than* it was three years ago.

Absolute and Relative Difference

- The **absolute difference** is the actual difference between the compared value and the reference value:

absolute difference = compared value – reference value

- The **relative difference** describes the size of the absolute difference as a fraction of the reference value:

$$\text{relative difference} = \frac{\text{absolute difference}}{\text{reference value}}$$

$$= \frac{\text{compared value} - \text{reference value}}{\text{reference value}} \times 100\%$$

Example: Income Comparison (1 of 4)

Recent data showed that California ranked first among the 50 states in average income, at about $68,900 per person, and West Virginia ranked last at $46,600 per person.

a. How much lower is average income in West Virginia than in California?

b. How much higher is average income in California than in West Virginia?

Answer both questions in both absolute and relative terms.

Example: Income Comparison (2 of 4)

Solution

a. absolute difference = compared value – reference value

$$= \$46{,}600 - \$68{,}900$$

$$= -\$22{,}300$$

$$\text{rel diff} = \frac{\text{compare value} - \text{reference value}}{\text{reference value}} \times 100\%$$

$$= \frac{\$46{,}600 - \$68{,}900}{\$68{,}900} \times 100\%$$

$$= -32.4\%$$

Example: Income Comparison (3 of 4)

The negative signs tell us that average income in West Virginia is *less than* that in California by $22,300, or by about 32.4%.

b. This time West Virginia follows *than*, so we use the West Virginia income as the reference value and the California income as the compared value:

absolute difference = compared value – reference value

= $68,900 – $46,600

= $22,300

Example: Income Comparison (4 of 4)

Relative difference: $= \dfrac{\text{compare value} - \text{reference value}}{\text{reference value}} \times 100\%$

$$= \frac{\$68{,}900 - \$46{,}600}{\$46{,}600} \times 100\%$$

$$\approx 47.9\%$$

Average income in California is *more than* that in West Virginia by $22,300, or by about 47.9%.

Now Hiring: $20 starting pay with opportunities for up to 50% raise…

Congrats you are hired at $20 per hour!

Performance Review 1: Earned 50% raise!

$$50\% \; of \; \$20$$
$$0.50 * (\$20)$$
$$\$10 \; raise!$$

$$Now \; making \; \$20 + \$10 = \$30$$

Performance Review 2: Earned 50% decrease!

$$50\% \; of \; \$30$$
$$0.50 * (\$30)$$
$$\$15 \; decrease!$$

$$Now \; making \; \$30 - \$15 = \$15$$

Of versus *More Than* (or *Less Than*)

- If the new or compared value is *P% more than* the reference value, it is **(100 + *P*)%** *of* the reference value.
- If the new or compared value is *P% less than* the reference value, it is **(100 − *P*)%** *of* the reference value.

Example: Income Difference

Jada earns 200% more than Reggie. What is Jada's income as a percentage *of Reggie's*? How many times as large as Reggie's income is Jada's?

Solution

We use the rule that *P% more than* means
(100 + *P)% of.* Because Jada's income is 200% more than Reggie's, we set $P = 200$.
Therefore, Jada's income is (100 + 200)% = 300% of Reggie's income. Because 300% = 3, Jada earns 3 times as much as Reggie.

Example: Sale!

A store is having a “25% off” sale. How does an item’s sale price compare to its original price?

Solution

The “25% off” means that an item’s sale price is 25% *less than* its original price. The sale price is (100 – 25)% = 75% *of* the original price. For example, if the original price is $100, the sale price is $75.

Percentages of Percentages

When a change or difference is expressed

- in percentage points, assume it is an absolute change or difference.
- with the % sign or the word *percent*, it is a relative change or difference.

Example: If a bank increases its interest rate from 3% to 4%, the interest rate increased by 1 percentage point.

$$\text{relative change} = \frac{4\% - 3\%}{3\%} \times 100\% = 33\%$$

Solving Percentage Problems

- If the compared value is *P% more than* the reference value, then

$$\text{compared value} = (100 + P)\% \times \text{reference value}$$

and

$$\text{reference value} = \frac{\text{compared value}}{(100 + P)\%}$$

- If the compared value is *less than* the reference value, use (100 – *P*) instead of (100 + *P*) in the above calculations.

Example: Tax Calculations

You purchase a shirt with a labeled (pre-tax) price of $21. The local sales tax rate is 6%. What is your final cost (including tax)?

final cost = labeled price + (6% of labeled price)

$= (100 + 6)\% \times$ labeled price

$= 106\% \times \$21 = 1.06 \times \$21 = \$22.26$

Abuses of Percentages

- Beware of Shifting Reference Values

  A 10% pay cut is followed by a 10% pay raise.

- Less than Nothing

  Decrease caloric intake by 150% to lose weight.

- Don’t Average Percentages

  If 70% of the boys and 60% of the girls in a class voted to go to a water park, then 65% of the students in the class voted to go to the water park.

Example: Shifting Investment Value (1 of 2)

A stockbroker offers the following defense to angry investors: “I admit that the value of your investments fell 60% during my first year on the job. This year, however, their value has increased by 75%, so you are now 15% ahead!” Evaluate the stockbroker’s defense.

Example: Shifting Investment Value (2 of 2)

Solution Imagine that you began with an investment of $1000. During the first year, your investment lost 60% of its value, or $600, leaving you with $400. During the second year, your investment gained 75% of $400, or 0.75($400) = $300. Therefore, at the end of the second year, your investment was worth
$400 + $300 = $700, which is still *less* than your original investment of $1000 and certainly not a 15% gain overall. We can trace the problem with the stockbroker's defense to a shifting reference value: It was $1000 for the first calculation and $400 for the second.

Example: Impossible Sale

A store advertises that it will take “150% off” the price of all merchandise. What should happen when you go to the checkout to buy a $500 item?

Solution
If the price were 100% off, the item would be free. So if the price is 150% off, the store should pay you half the item’s cost, or $250. More likely, the store manager did not understand percentages.

Example: Batting Average (1 of 3)

In baseball, a player's batting average represents the percentage of at-bats in which he got a hit. For example, a batting average of .350 means the player got a hit 35% of the times he batted.

Suppose a player had a batting average of .200 during the first half of the season and .400 during the second half of the season.

Can we conclude that his batting average for the entire season was .300 (the average of .200 and .400)? Why or why not?

Give an example that illustrates your reasoning.

Example: Batting Average (2 of 3)

Solution

No. For example, suppose the player had 300 at-bats during the first half of the season and 200 at-bats during the second half, for a total of 500 at-bats. His first-half batting average of .200 means he got hits in 20% of his 300 at-bats, or 0.2 ×300 = 60 hits. His second-half batting average of .400 means he got hits in 40% of his 200 at-bats, or 0.4 × 200 = 80 hits.

Example: Batting Average (3 of 3)

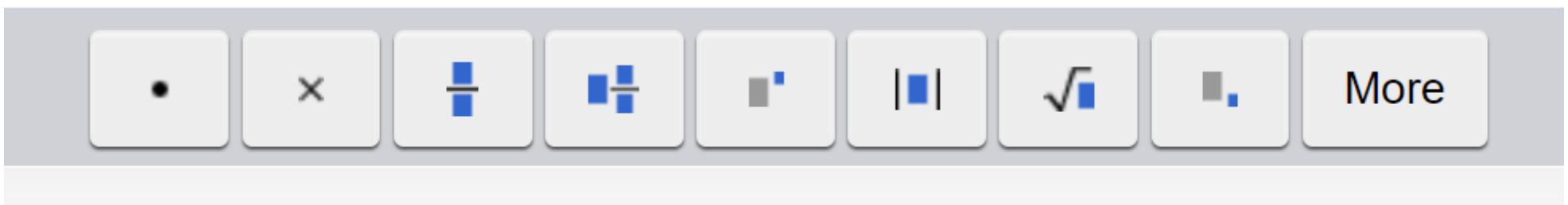
For the season, he got a total of 60 + 80 = 140 hits in his 500 at-bats, so his season batting average was 140/500 = 28%, or .280—not the .300 found by averaging his first-half and second-half batting percentages. (In fact, the only case in which his season average would be .300 is if he had precisely the same number of at-bats in each half of the season.)

That's incorrect.

Correct answer: 2.8×10^{7}

Your answer: $2.8x10^{7}$

OK



Estimate the following quantities without using a calculator. Then find a more precise result, using a calculator if necessary. Discuss whether the approximation technique worked.

a. 5.6 billion ÷ 200
b. 20 million ÷ 110,000
c. 7,000 × 54,923

- TOPHAT

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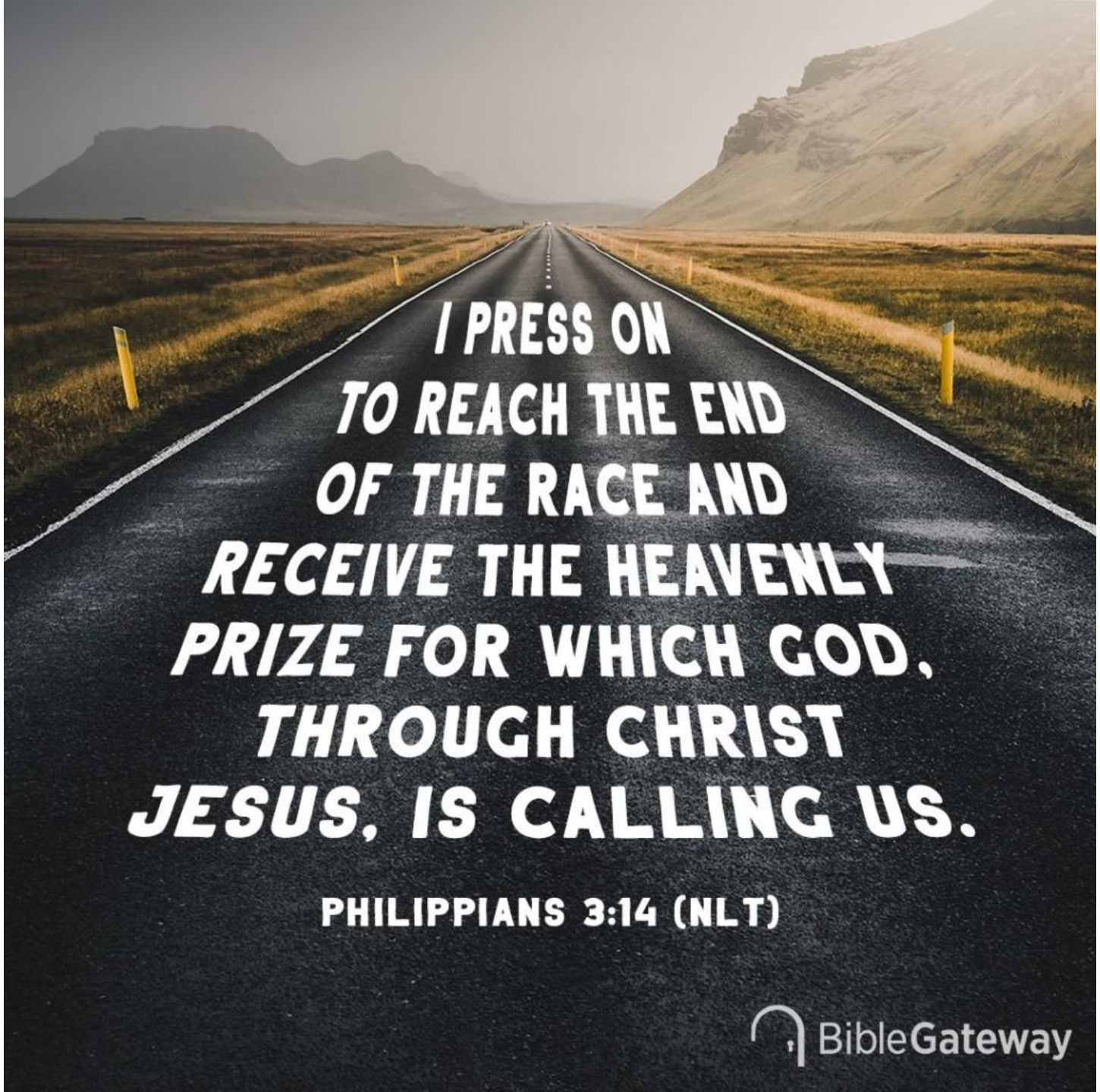

I PRESS ON
TO REACH THE END
OF THE RACE AND
RECEIVE THE HEAVENLY
PRIZE FOR WHICH GOD,
THROUGH CHRIST
JESUS, IS CALLING US.
PHILIPPIANS 3:14 (NLT)
BibleGateway

Unit 3B

Putting Numbers in Perspective

Join Sophia Payne and Scott Busby as they explore all kinds of issues that can cause university students to feel **overwhelmed**. This fall, Sophia and Scott will tackle the topic of **healthy community** in **season three** of the University Overwhelm podcast. If you could use some guidance and encouragement as you seek to establish a **sense of community** at Liberty University, you won't want to miss it! In the meantime, you can check out some of our previous episodes on **life skills** (season one) and **local church involvement** (season two) here. A handful of our most popular episodes are linked below:

- S1 EP19 How to Study Your Bible
- S2 EP13 Parachurch Ministries
- S1 EP9 Technology: Positives and Negatives
- S2 EP1 Faith in the College Years
- S1 EP11 Personality Tests

Liberty

joel muddamalle

Joel serves as the Director of Theology and Research for Proverbs 31 Ministries and Lysa TerKeurst, and is a part of the preaching team at Transformation Church with Pastor Derwin Gray. Joel earned a PhD in Theology under Drs. Patrick Schreiner (NT) and Michael Heiser (OT) with an emphasis on Paul's household language in Ephesians as it relates to the Old Testament. He loves studying and teaching the brilliant truths found in Scripture and unpacking how they relate to our everyday lives.

Scientific Notation

Scientific notation is a format in which a number is expressed as a number *between* 1 and 10 multiplied by a power of 10.

Examples:

6,700,000,000 in scientific notation is 6.7×10^{9}

0.000000000000002 is 2.0×10^{-15}

Giving Meaning to Numbers

Perspective through estimation

An **order of magnitude** estimate specifies a broad range of values, usually within one or two powers of ten, such as “in the ten thousands” or “in the millions.”.

Example: Order of Magnitude of Ice Cream Spending

Is the total annual ice cream spending in the United States measured in thousands of dollars, millions of dollars, or billions of dollars?

"Reasonably guess that an average person has something like 50 servings of ice cream per year."

$$\text{spending} = 50\,\frac{\text{servings}}{\text{person}\times\text{yr}}\times\frac{\$1}{\text{serving}}\times\left(3\times10^{8}\right)\text{people}$$

$$=\frac{1.5\times10^{10}}{1\text{ yr}}\approx\$15\text{ billion per year}$$

Giving Meaning to Numbers

Perspective through comparisons

TABLE 3.1 Selected Energy Comparisons

Item	Energy (joules)
Energy released by metabolism of 1 average candy bar	1×10^6
Energy needed for 1 hour of running (adult)	4×10^6
Energy released by burning 1 liter of oil	3.4×10^7
Electrical energy used in an average home daily	5×10^7
Energy released by burning 1 kilogram of coal	1.6×10^9
Energy released by fission of 1 kilogram of uranium-235	5.6×10^{13}
Energy released by fusion of hydrogen in 1 liter of water	6.9×10^{13}
U.S. annual energy consumption	1.0×10^{20}
World annual energy consumption	6.3×10^{20}
Annual energy generation of Sun	1×10^{34}

Example: U.S. vs. World Energy Consumption (1 of 2)

Compare the U.S. population to the world population and U.S. energy consumption to world energy consumption. What does this tell you about energy usage by Americans?

Solution

World population = 8 billion (8×10^9)

U.S. population = 300 million (3×10^8).

$$\frac{US}{\text{world}} \approx \frac{3 \times 10^8}{8 \times 10^9} = \frac{3}{8} \times 10^{-1} \approx 0.0375 = 3.75\%$$

Example: U.S. vs. World Energy Consumption (2 of 2)

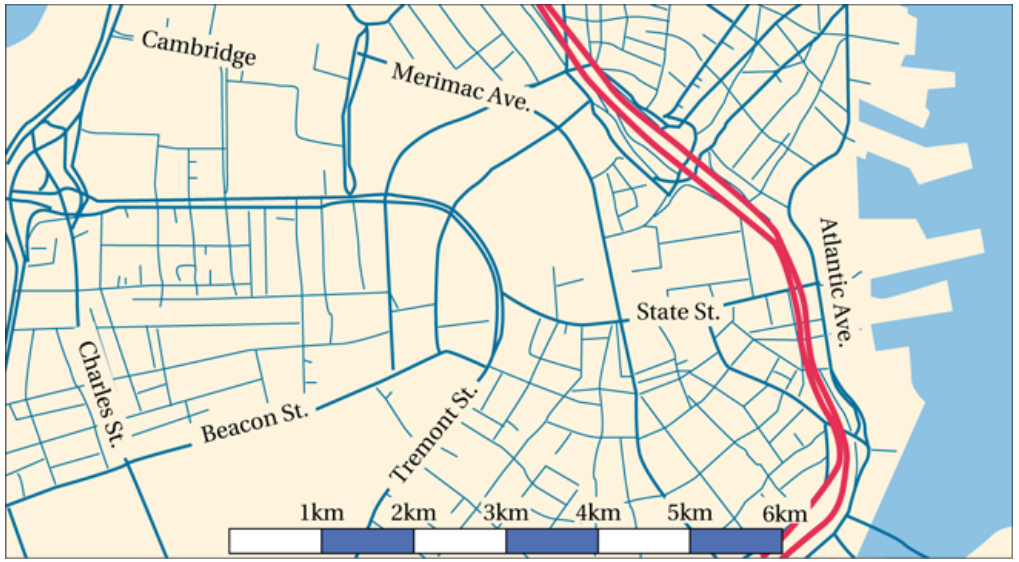
The U.S. population is only about 4% of the world's population but, as shown in Table 3.1, the United States uses about 1/6.3, or about 16%, of the world's energy. That is, Americans use more than four times as much energy per person as the world average.

Giving Meaning to Numbers

Perspective through scaling

Verbally: “1 cm = 1 km”

Graphically:



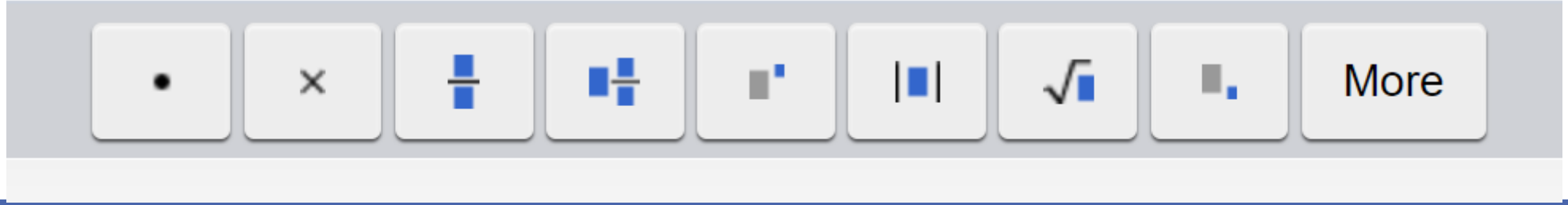
As a ratio: 1 cm = 1 km means a scale ratio of 1 to 100,000

That's incorrect.

Correct answer: 2.8×10^{7}

Your answer: $2.8x10^{7}$

OK



Complete the following sentence.

As of 2020, the life expectancy (at birth) of women in a particular country (79.7 years) is _____ percent greater than the life expectancy of men in that same country (74.3 years).

As of 2020, the life expectancy (at birth) of women in a particular country (79.7 years) is 7.2 percent greater than the life expectancy of men in that same country (74.3 years). (Round the final answer to one decimal place as needed. Round all intermediate values to three decimal places as needed.)

$$\frac{79.7-74.3}{74.3} = 0.07267833109$$

$$\text{round}(\underbrace{0.07267833109}_{\text{ans}},3) = 0.073$$

$$\underbrace{0.073}_{\text{ans}} \cdot 100 = 7.3$$

Compare A and B in three ways, where A = 1.6 million is the 2012 population of city X and B = 2.3 million is the 2012 population of city Y.

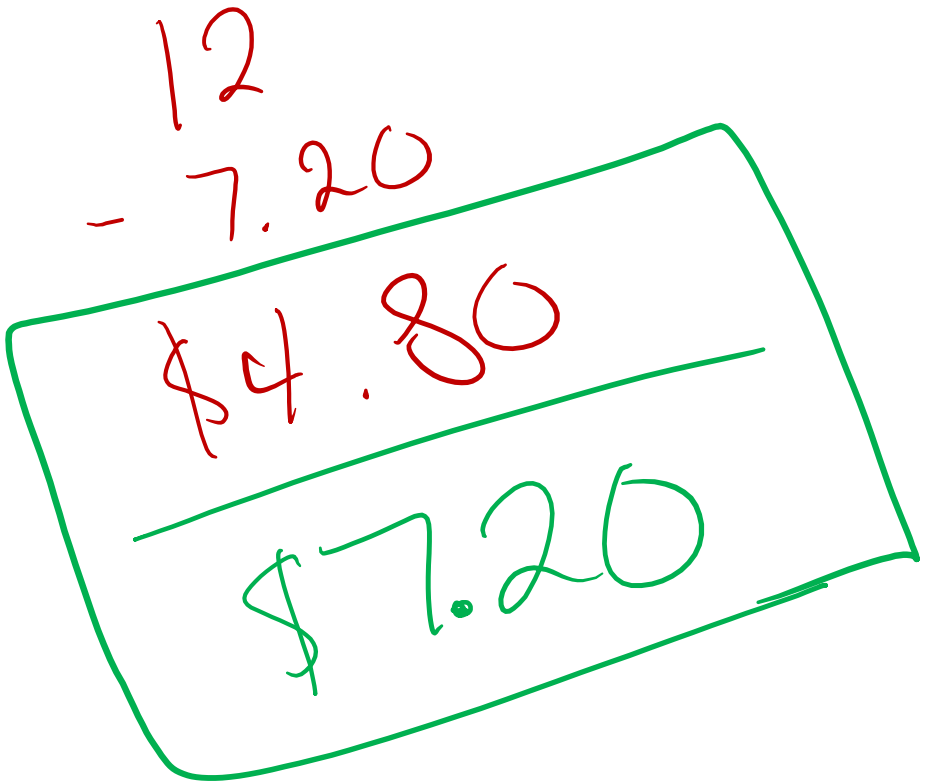
a. Find the ratio of A to B.
b. Find the ratio of B to A.
c. Complete the sentence: A is ____ percent of B.

(a) $\frac{A}{B} = \frac{1.6 \text{ mil}}{2.3 \text{ mil}} = \checkmark$

(b) $\frac{2.3}{1.6}$

Convert to a percent
Get Decimal x100

The price of oil recently went from $7.20 to $12.00 per case of 12 quarts. Find the ratio of the increase in price to the original price.



Write as decimal rounded to the nearest thousandth.

$$\frac{17}{48}$$

0.354

1000

Express as a percentage.

$0.90 \times 100\%$ $\boxed{90\%}$

Express as a reduced fraction.

$\frac{90}{100}$ $\boxed{\frac{9}{10}}$

Compare A and B in three ways, where A=90.4% is the 2021 high school graduation rate in State X and B= 85.7% is the 2021 high school graduation rate in State Y.

a. Find the ratio of A to B.

$90.4/85.7 = 1.05$ ←

b. Find the ratio of B to A.

$85.7/90.4 \approx 0.95$

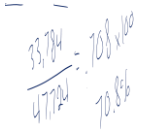
c. Complete the sentence: A is 105 percent of B.

In the following statement, express the first number as a percentage of the second number.

The full-time year-round median salary for workers in a certain country was $33,784 in 2000, compared to $47,724 in 2020.

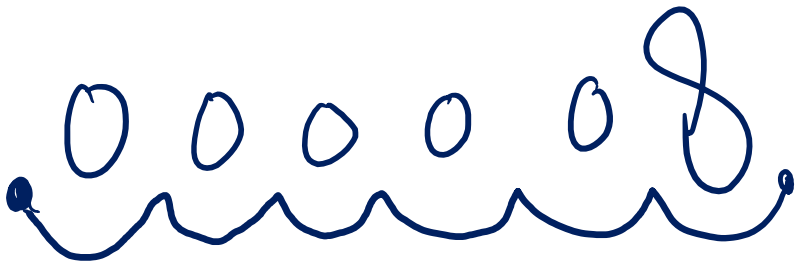
$$\frac{33,784}{47,724} = .708 \times 100$$

$$70.8\%$$



Write the number in ordinary notation.

$$8 \times 10^{-6}$$



Write the number in scientific notation.

0.000000841

8.41×10^{-7}

Determine whether the claim makes sense.

"A popular local restaurant serves 5 million diners each year."

$\frac{5000000}{365}$ over 10,000

False

Example: Earth and Sun (1 of 4)

The distance from the Earth to the Sun is about 150 million kilometers. The diameter of the Sun is about 1.4 million kilometers, and the equatorial diameter of the Earth is about 12,760 kilometers. Put these numbers in perspective by using a scale model of the solar system with a 1 to 10 billion scale.

Solution

$$\text{scaled Earth-Sun distance} = \frac{\text{actual distance}}{10^{10}}$$

$$= \frac{1.5 \times 10^{8}}{10^{10}}$$

Example: Earth and Sun (2 of 4)

$$= \frac{1.5 \times 10^{8}}{10^{10}}$$

$$= 1.5 \times 10^{-2}\ \text{km}\ \times 10^{3}\ \frac{\text{m}}{\text{km}} = 15\ \text{m}$$

Note that, in the last step, we converted the distance from kilometers to meters because it is easier to understand “15 meters” than “0.015 kilometer.” We find the scaled Sun and Earth diameters similarly, this time converting the units to centimeters and millimeters, respectively:

Example: Earth and Sun (3 of 4)

$$\text{scale Sun diameter} = \frac{\text{actual Sun diameter}}{10^{10}}$$

$$= \frac{1.4 \times 10^{6}\ \text{km}}{10^{10}}$$

$$= 1.4 \times 10^{-4}\ \text{km} \times 10^{5}\ \frac{\text{cm}}{\text{km}} = 14\ \text{cm}$$

Example: Earth and Sun (4 of 4)

$$\text{scale Earth diameter} = \frac{\text{actual Earth diameter}}{10^{10}}$$

$$= \frac{1.276 \times 10^{4}\ \text{km}}{10^{10}}$$

$$= 1.276 \times 10^{-6}\ \text{km} \times 10^{6}\ \frac{\text{mm}}{\text{km}} = 1.276\ \text{mm}$$

The model Sun, at 14 centimeters in diameter, is roughly the size of a grapefruit. The model Earth, at about 1.3 millimeters in diameter, is about the size of the ball point in a pen, and the distance between them is 15 meters.

FRIDAY WEEK THREE

Spring 2025

Decide whether the following statement makes sense (or is clearly true) or does not make sense (or is clearly false). Explain your reasoning.

I've seen about 10^{50} commercials on TV.

The statement [▼] make sense. Put the number in perspective by thinking in terms of time. A TV commercial is about 1 minute long, so it would take 10^{50} minutes to watch 10^{50} commercials.

$$10^{50}\ \text{min} \times \left(\frac{1\ \text{hr}}{60\ \text{min}}\right) \times \left(\frac{1\ \text{day}}{24\ \text{hr}}\right) \times \left(\frac{1\ \text{yr}}{365\ \text{days}}\right) \approx \square\ [\ \blacktriangledown\ ]$$

(Type your answer in scientific notation, using the appropriate symbol from the math palette for any multiplication. Round to one decimal place as needed.)

Case Study: What is a Billion Dollars? (1 of 3)

One way to put $1 billion in perspective is to ask a question like “How many people can you employ with $1 billion per year?” Let’s suppose that employees receive a fairly high average salary of $100,000 and that it costs a business an additional $100,000 per year in overhead for each employee (costs for office space, computer services, health insurance, and other benefits). The total cost of an employee is therefore $200,000, so $1 billion would allow a business to hire

Case Study: What is a Billion Dollars? (2 of 3)

$$\frac{\$1 \text{ billion}}{\$200{,}000 \text{ per employee}} = \frac{\$10^9}{\$2 \times 10^5 \text{ / employee}} = 5 \times 10^3$$

One billion dollars per year could support a work force of some 5000 employees.

Case Study: What is a Billion Dollars? (3 of 3)

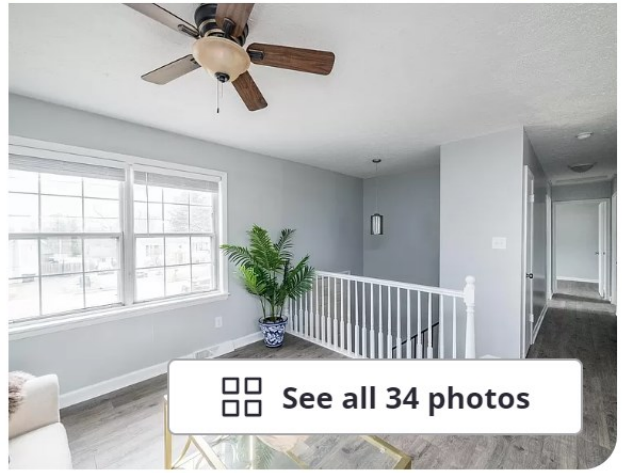
Another way to put $1 billion in perspective also points out how different numbers can be, even when they sound similar (like million, billion, and trillion). Suppose you become a sports star and earn a salary of $1 million per year. How long would it take you to earn a billion dollars? We simply divide $1 billion by your salary of $1 million/year:

$$\frac{\$1 \text{ billion}}{\$1 \text{ million/ yr}} = \frac{\$10^9}{\$10^6 \text{ / yr}} = 10^3 \text{ yr} = 1000 \text{ yr}$$

Even at a salary of $1 million per year, earning a billion dollars would take a thousand years.

The national debt was about $6.9 trillion at the end of 2003. Assuming the U.S. population was 280 million, express this quantity as the number of dollars per person.

$$\frac{dollars}{people} = \frac{\$6900000000000}{280000000\ people} = \frac{\$24642.86}{1\ person}$$



$259,900

1032 Long Meadows Dr, Lynchburg, VA 24502

4 beds | **2** baths | **1,680** sqft

Est.: **$1,500/mo** Get pre-qualified

Request a tour
as early as today at 11:00 am

Contact agent

Estimated monthly payment

$1,500

Principal & interest	**$1,223**

Home price

$ 259,900

Down payment

$ 51,980 | 20 %

Loan program

30-year fixed

Interest rate

5.822 %

See current rates

Mortgage insurance	**$0**
Property taxes	**$186**
Home insurance	**$91**
HOA fees	**N/A**
Utilities	**Not included**

Home Price	259900	259900
Down Payment	51980	51980
Loan Amount	=B1-B2	207920
Years	30	30
APR	5.82%	5.82%
Monthly Payment	=PMT(B5/12,B4*12,B3)	($1,222.63)

What if you switch it to 15 years?

Purchase Rates | Refinance Rates

Product	Interest Rate	APR
Jumbo Loans– Amounts that exceed conforming loan limits		
7/6-Month ARM Jumbo	6.000%	7.099%
15-Year Fixed-Rate Jumbo	6.125%	6.308%
30-Year Fixed-Rate Jumbo	6.250%	6.349%
Conforming and **Government Loans**		
7/6-Month ARM	6.250%	7.323%
15-Year Fixed Rate	5.375%	5.683%
30-Year Fixed-Rate VA	5.750%	6.068%
30-Year Fixed Rate	6.000%	6.201%

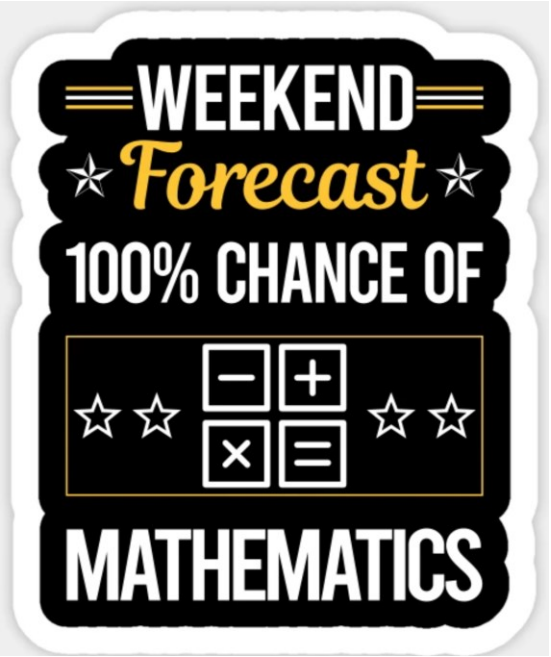
Rates, terms, and fees as of 2/01/2024 10:15 AM Eastern Standard Time and subject to change without notice.

The Active Student

Start Assignments Early → Use Resources → Ask Questions → High Standards

Help me solve this

Ask my instructor



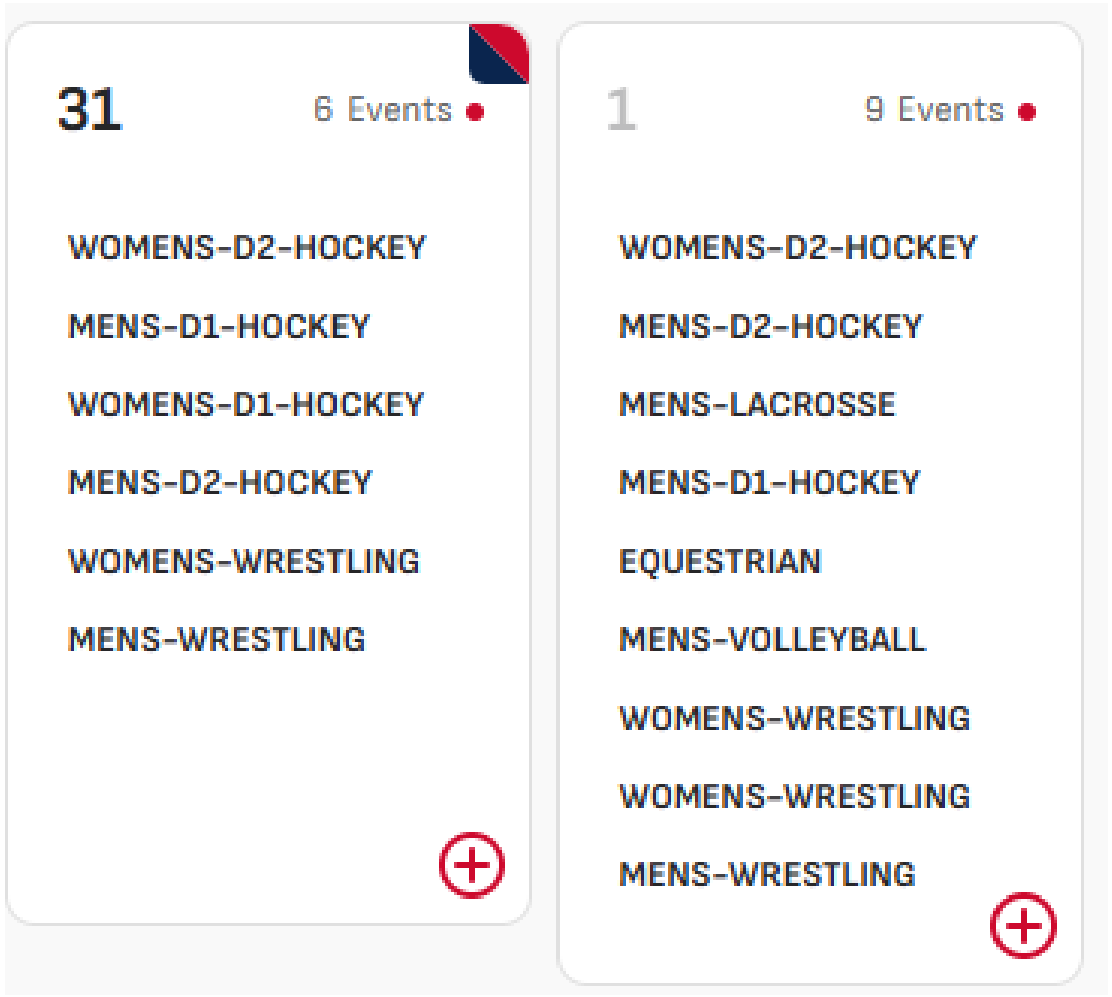
The Responsive Professor

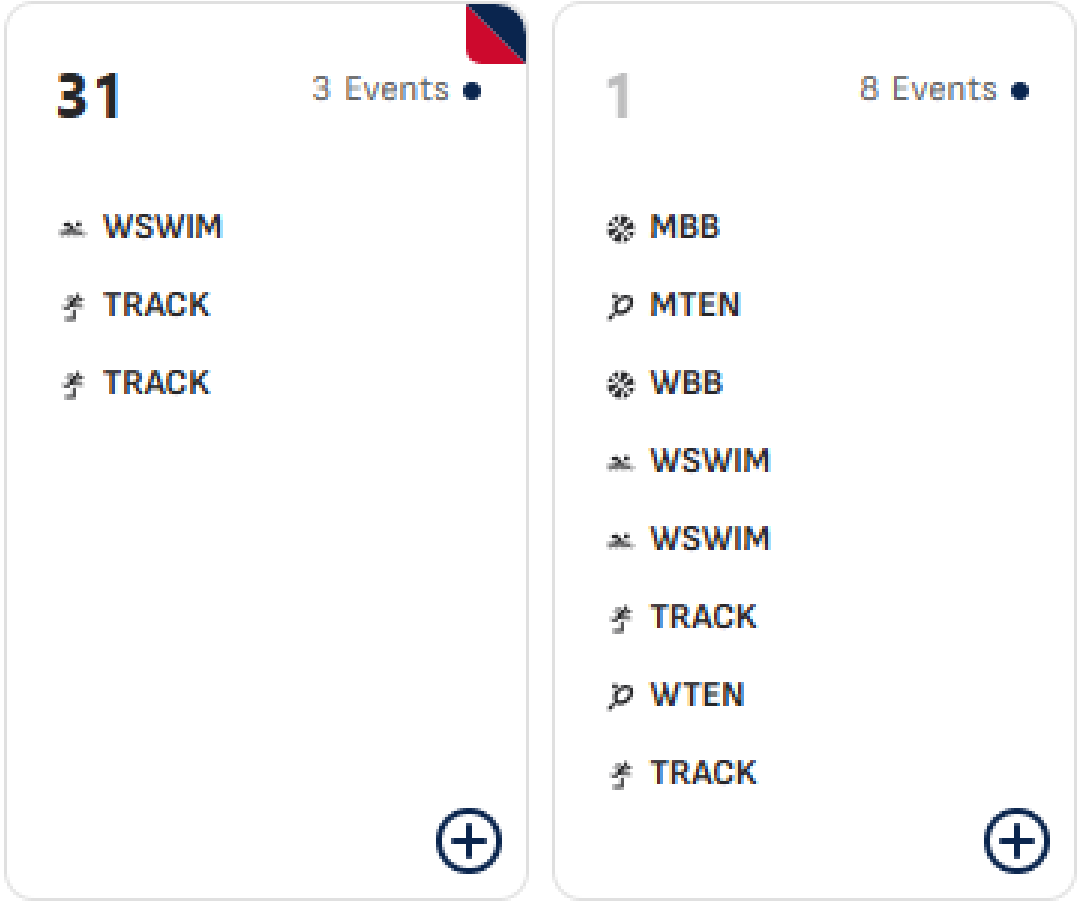
Provide Clear Lectures → Provide Resources → Answer Questions → High Standards

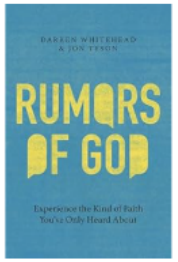
Antoine Bradford

Friday, January 31, 2025 | 8:00 pm | LaHaye Event Space

See Details


31
6 Events
WOMENS-D2-HOCKEY
MENS-D1-HOCKEY
WOMENS-D1-HOCKEY
MENS-D2-HOCKEY
WOMENS-WRESTLING
MENS-WRESTLING
1
9 Events
WOMENS-D2-HOCKEY
MENS-D2-HOCKEY
MENS-LACROSSE
MENS-D1-HOCKEY
EQUESTRIAN
MENS-VOLLEYBALL
WOMENS-WRESTLING
WOMENS-WRESTLING
MENS-WRESTLING


31
3 Events
WSWIM
TRACK
TRACK
1
8 Events
MBB
MTEN
WBB
WSWIM
WSWIM
TRACK
WTEN
TRACK

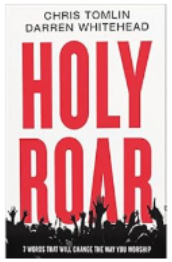


Rumors of God: Experience the Kind of Faith You…

★★★★½ 188

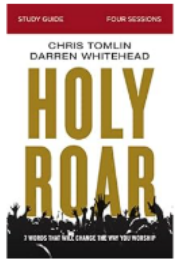
The Digital Fast Workbook: Detox Your Mind and R…

★★★★★ 1



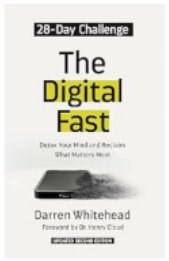
Holy Roar: 7 Words That Will Change The Way You Wor…

★★★★★ 922

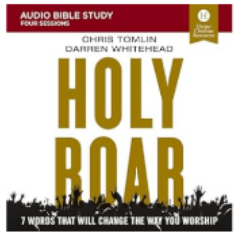


Holy Roar Bible Study Guide: Seven Words That Will…

★★★★½ 147

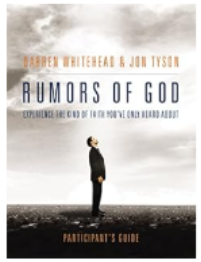


The Digital Fast: Detox Your Mind and Reclaim Wha…



Holy Roar: Audio Bible Studies: Seven Words Tha…

★★★★★ 538



Rumors of God Bible Study Participant's Guide

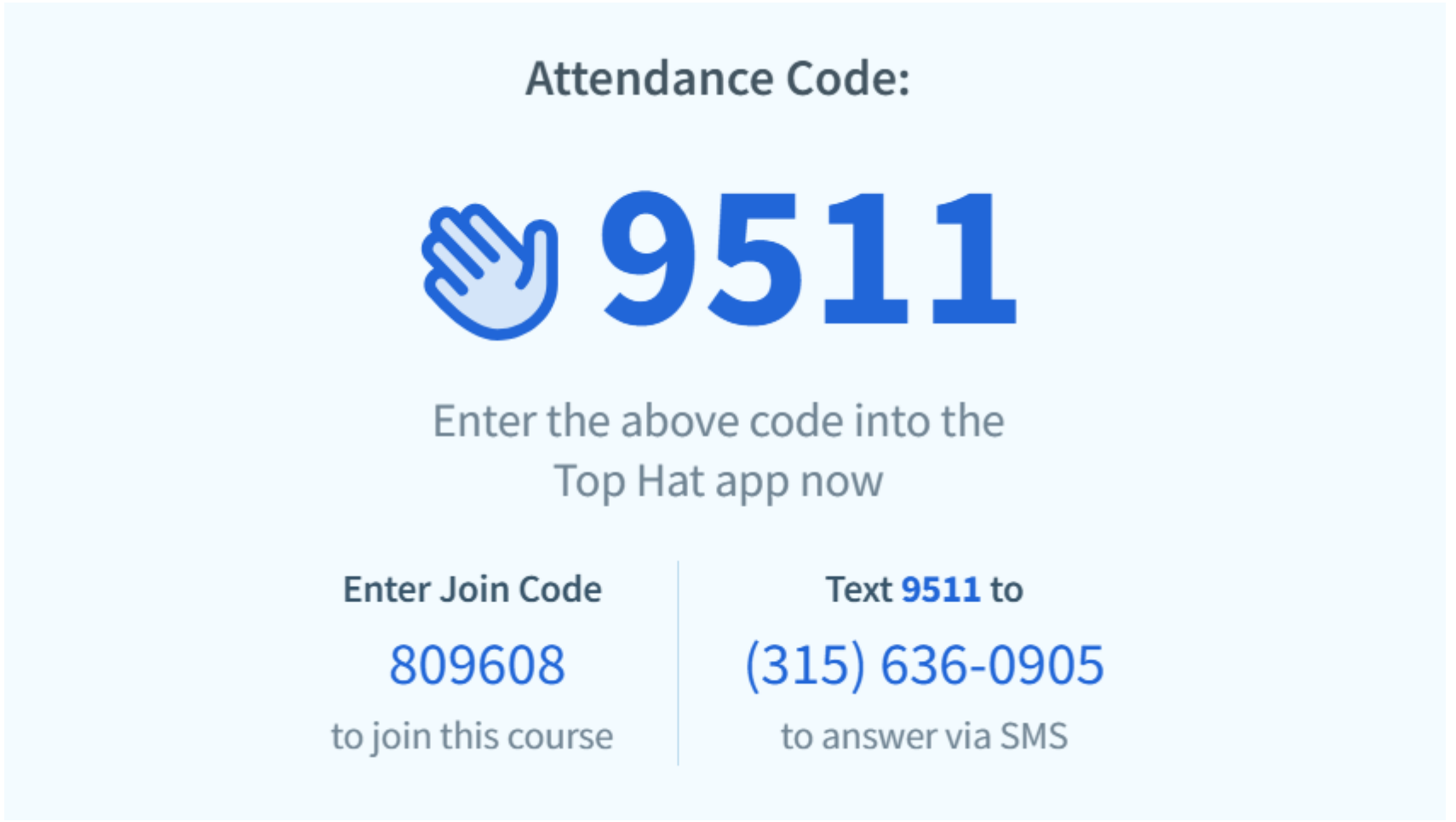
★★★★★ 1

Rumors of God DVD-Based Study

★★★★½ 3

Tophat & Prayer

- Prof Volk Wife Sick
- Prof Volk Healthy Plan
- Campus Sicknesses
- Anxiety in America



Stay Sassy and Drink Water

QUESTIONS?