The Phoenix-Word-Problem: A New Life for Online Discussion Prompts

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A train leaves Cairo at 3:00 am, averaging 30 mph.

Another train headed in the same direction leaves Cairo at 6:00 am, averaging 60 mph.

How many hours after the second train leaves will it overtake the first train?
This passage is adapted from Edith Wharton, *Ethan Frome*, originally published in 1911. Mattie Silver is Ethan’s household employee.

Mattie Silver had lived under Ethan’s roof for a year, and from early morning till they met at supper he had frequent chances of seeing her; but no moments in her company were comparable to those when, her arm in his, and her light step flying to keep time with his long stride, they walked back through the night to the farm. He had taken to the girl from the first day, when he had driven over to the Flats to meet her, and she had smiled and waved to him from the train, crying out, “You must be Ethan!” as she jumped down with her bundles, while he reflected, looking over her slight person: “She don’t look much on housework, but she ain’t a fretter, anyhow.” But it was not only that the coming to his house of a bit of hopeful young life was like the lighting of a fire on a cold hearth. The girl was more than the bright serviceable creature he had thought her. She had an eye to see and an ear to hear: he could show her things and tell her things, and taste the bliss of feeling that all he imparted left long reverberations and echoes he could wake at will.
The description in the first paragraph indicates that what Ethan values most about Mattie is her

- fitness for farm labor.
- vivacious youth.
- receptive nature.
- freedom from worry.
Online Discussions

- Students work at their own pace
- Outside of classroom discussion
- Facilitates peer learning
- Enables students to practice writing
- Involves more introverted students
- Facilitates critical thinking skills

See more detail in Table 1, Aloni et al, 2018.
Nobelium, an element discovered in 1958, has a half-life of 10 min under certain conditions. In a sample containing 1 g of nobelium, the amount left after t min is given by $A(t) = (0.5)^{t/10}$.

(Round to three decimal places.)

How much nobelium is left after 5 min?

How much nobelium is left after 1 hr?

Published in Beginning and Intermediate Algebra (Miller, 2018)
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How much nobelium is left after 5 min?

How much nobelium is left after 1 hr?

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The half-life of caffeine is about 5.7 hours. This means that half of the caffeine intake will still be in your system after 5.7 hours. The amount of caffeine, \( C \) in mg, left after t hours is given by \( A(t) = C (0.5)^{t/5.7} \).

Consider bedtime at 9pm. How much caffeine would remain in their system if:

- You drank it between 11am-2pm (lunch time)?
- You drank it between 3-6pm (dinner time)?
- Share some advice to others based on your calculations.

Published in Beginning and Intermediate Algebra (Miller, 2018)
Phoenix
Transformation

Select a Topic

Get in the Mood!

Write Effective Prompts

Thwart Plagiarism

Self-Assess
Step 1: Select a Topic

- Hard to understand via text
- Minimally covered in text
- Requires interactivity
- Would be fun!
Step 2: Get in the Mood!

• Word problems from text
• Class projects/case studies
• Traditional classroom group projects or lesson plans
• Applications from your experience
Your Turn

- What topic do you need to teach?
- What topic would be good with interactivity?
- What topic might be fun?
- Any lessons/activities that are great in-person?
As part of a research project, a biology class plans to estimate the number of fish living in a lake thought to be polluted. They catch a sample of 35 fish, tag them, and release them back into the lake. A week later, they catch 80 fish and find that 5 of them are tagged.

About how many fish live in the lake?
Step 3: Write Effective Prompts

- Target Bloom’s highest levels of critical thinking
- Divergent Questions
  - Brainstorm
  - Focal-Point
  - Playground

See more detail in Table 4, Aloni et al, 2018.
Propose a community program that you would like to kick start. Choose something you are passionate about...

- A brief overview of the community program
- Proposed budget percentages to help prepare for fundraising (administrative costs, supplies, rent, advertising, etc.).
- Proposed number of volunteers. Also calculate the percentage of volunteers based on total number of people in the community.
- Estimated percentage of people (or animals) in the community that would benefit from the program.
Your friend’s home flooded recently, and all her furniture was ruined... You have been tasked with estimating how much money should be raised for help.

Explore living room furniture purchase options online. Choose at least six pieces of furniture. In your post, you will list each item, include the item URL, and include the approximate cost of the item rounded to the nearest $100. Calculate the estimated total of your purchase.
Step 3: Write Effective Prompts

- Creative approaches
  - Role-playing
  - Debate
  - Teamwork
- Guided Peer Replies
Example Role-Playing: Discrete Math

You are working as an IT consultant that is known to have keen mathematical skills in addressing real world situations. You have recently been contacted by a city council to present a plan for a population growth/decline initiative. The council has in recent years experienced considerably unexpected changes in population that has left them scrambling to find remedies for the city (e.g. new roads if population is growing, repurpose vacant lots if population is declining).

You will spear-head this initiative, and you are charged with planning a mathematical model for future use and prioritizing the city council’s use of technology.
Secret Spy Team

1. Each team member encodes one detail of secret meeting
   - Location, Where to Be, Time, What to Bring, What to Wear, What to Do, Password to Say, Password to Reply

2. Classmate decodes message

3. Summary
1. Create/choose a function
   \[ f(x) = 2x + 1 \]
2. Write out your mascot
   \[ f(x) = 4x \]
3. Change letters into numbers
   \[ f(x) = x + 7 \]
4. Encrypt each number with function
   \[ f(x) = 3x - 2 \]

What was your College Mascot?

Image courtesy of Pixabay
1. Create/choose a function
   \[ f(x) = 2x + 1 \]
2. Write out your mascot
   \[ g(x) = (x - 1)/2 \]
3. Change letters into numbers
   \[ f(x) = 4x \]
4. Encrypt each number with function
   \[ g(x) = x/4 \]
5. Pass
   \[ f(x) = x + 7 \]
6. Find inverse of function
   \[ g(x) = x - 7 \]
\[ f(x) = 3x - 2 \]
\[ g(x) = (x + 2)/3 \]
1. Create/choose a function
2. Write out your mascot
3. Change letters into numbers
4. Encrypt each number with function
5. Pass
6. Find inverse of function
7. Pass
8. Use inverse to decrypt
9. Change numbers into letters

What was your College Mascot?

A 1
B 2
C 3
D 4
E 5
F 6
G 7
H 8
I 9
J 10
K 11
L 12
M 13
N 14
O 15
P 16
Q 17
R 18
S 19
T 20
U 21
V 22
W 23
Y 24
X 25
Z 26
SPACE 27

Image courtesy of Pixabay

$g(x) = \frac{x}{2}$

14 30 32 16 10 36 38

7 15 16 8 5 18 19

G O P H E R S
Step 4: Thwart Plagiarism

General Guidelines:

• Rotate the curriculum
• Encourage critical thinking
• Instructor’s active role
• Manageable workload

Math Specific:

• Current and unique
• Student relevant
• Class-generated
Example Current & Unique: Business Analytics

Explore recent polls at http://www.pollingreport.com

Search the site and find a poll where the sample size and margin of error are given.

- Interpret the results of your ... the sample size n, and the margin of error MoE (also known as sampling error).
- State the confidence interval using the given MoE and statistics shared.
- Calculate the confidence interval based on a 95% formula
- How does this compare with the Website?

Image by Tumisu from Pixabay
Example Student Relevant: Survey of Math

You are searching for a home in your area. A realtor has given you the median home price for the area. You would like to determine whether the mean, median, or mode home price best represents home prices in your area. Find a website that will allow you to search home prices in your area using specific criteria. Choose at least three criteria (number of bedrooms, square footage, lot size, garage size etc.) to narrow your search and find the prices of at least 10 homes.
For many random variables, we have assumed the variable is normal distributed. What if the random variable you are studying is not normally distributed? Here is your challenge – if the population is not normal, can you make any inferences about that population from your random samples?

- Collect and record the age of 25 pennies. Share with your class via Google Form.
- Describe the distribution shape of the population of penny ages.
- Randomly select 5 penny ages from this population. Calculate the mean of this Nickel Sample (sample size n = 5). How does this compare to the population mean?
Step 5: Self-Assess

• Feedback from colleagues
• Trial run
• Rate it!
Rate It?

- What might be an effective discussion prompt?
- Are we asking for higher-level critical thinking?
- Are we using divergent style questions?
- Are we using creative approaches to sustain conversation?
- Do we have guided peer replies?
- Can multiple students respond to any given student’s thread?
- Are we using current data?
- Are we using unique data?
- Are we requesting student-relevant data?
Let's Consider Proportions

What we did…. 10,000 Steps

One of the more popular fitness goals is to walk 10,000 steps per day. That can sound pretty daunting! But how long does it actually take?

- Using a basic timer, time yourself walking 75 steps, average pace.

Set up a proportion:

- Calculate how long it would take you to walk 10,000 steps at that same pace.
- Thinking about a typical day in your life, how could you add in that much time for walking? (You wouldn’t have to do it all at once.)
Selected References


https://pdfs.semanticscholar.org/7715/50b532c833de7ce0920e572bc8c1fbcd915d.pdf
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