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QUESTION 1

FILL BLANK

Mike earns $6.50 per hour plus 4% of his sales.

Enter an equation for Mike\\'s total earnings, E, when he works x hours and has a total of y sales, in dollars.

A.

See explanation below.

Correct Answer: A

E = 6.5x + 0.04y OR equivalent.

QUESTION 2

Read the text attached.

Passage 1

Critical information needed in fight to save wildlife

With global temperatures rising, an international group of 22 top biologists is calling for a coordinated effort to gather important species information that is urgently needed to improve predictions for the impact of climate change on future

biodiversity. Current predictions fail to account for important biological factors like species competition and movement that can have a profound influence on whether a plant or animal survives changes to its environment, the scientists say in

the September 9 issue of the journal Science. While more sophisticated forecasting models exist, much of the detailed species information that is needed to improve predictions is lacking.

"Right now, we\\'re treating a mouse the same way as an elephant or a fish or a tree. Yet we know that those are all very different organisms and they are going to respond to their environment in different ways," says University of Connecticut

Ecologist Mark Urban, the Science article\\'s lead author. "We need to pull on our boots, grab our binoculars, and go back into the field to gather more detailed information if we are going to make realistic predictions."

The 22 top biologists affiliated with the article identify six key types of biological information, including life history, physiology, genetic variation, species interactions, and dispersal, that will significantly improve prediction outcomes for individual

species. Obtaining that information will not only help the scientific community better identify the most at-risk populations and ecosystems, the scientists say, it will also allow for a more targeted distribution of resources as global temperatures

continue to rise at a record rate.

Current climate change predictions for biodiversity draw on broad statistical correlations and can vary widely, making it difficult for policymakers and others to respond accordingly. Many of those predictions tend not to hold up over time if

they

fail to account for the full range of biological factors that can influence an organism\\'s survival rate: species demographics, competition from other organisms, species mobility, and the capacity to adapt and evolve.

"We haven\\'t been able to sufficiently determine what species composition future ecosystems will have, and how their functions and services for mankind will change," says co-author Dr. Karin Johst of the Helmholtz Centre for Environmental

Research and the German Centre for Integrative Biodiversity Research. "This is because current ecological models often do not include important biological processes and mechanisms: so far only 23 percent of the reviewed studies have

taken into account biological mechanisms."

Generating more accurate predictions is essential for global conservation efforts. Many species are already moving to higher ground or toward the poles to seek cooler temperatures as global temperatures rise. But the capacity of different

organisms to survive varies greatly. Some species of frog, for instance, can traverse their terrain for miles to remain in a habitable environment. Other species, such as some types of salamander, are less mobile and capable of moving only a

few meters over generations.

"New Zealand\\'s strong foundation in ecological research will help," explains study co-author Dr. William Godsoe, a Lincoln University lecturer and member of New Zealand\\'s Bio-Protection Research Centre. "One of our hopes is to build on

these strengths and highlight new opportunities to improve predictions by explicitly considering evolution, interactions among species, and dispersal." This will aid in the development of strategies to manage impacts on species and

ecosystems before they become critical.

With more than 8.7 million species worldwide, gathering the necessary biological information to improve predictions is a daunting task. Even a sampling of key species would be beneficial, the authors say, as the more sophisticated models

will allow scientists to extrapolate their predictions and apply them to multiple species with similar traits.

The researchers are calling for the launch of a global campaign to be spearheaded by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services or IPBES. The IPBES operates under the auspices of four United

Nations entities and is dedicated to providing scientific information to policymakers worldwide. One thousand scientists from all over the world currently contribute to the work of IPBES on a voluntary basis. The scientists are also encouraging

conservation strategies to support biodiversity such as maintaining dispersal corridors, and preserving existing natural habitats and genetic diversity.

"Our biggest challenge is pinpointing which species to concentrate on and which regions we need to allocate resources," says UConn Associate Professor Urban. In an earlier study in Science, Urban predicted that as many as one in six

species internationally could be wiped out by climate change. "We are at a triage stage at this point. We have limited resources and patients lined up at the door."

Passage 2

Forecasting climate change\\'s effects on biodiversity hindered by lack of data

An international group of biologists is calling for data collection on a global scale to improve forecasts of how climate change affects animals and plants. Accurate model predictions can greatly aid efforts to protect biodiversity from

disturbances such as climate change and urban sprawl by helping scientists and decision-makers better understand, anticipate and respond to threats that imperil species and ecosystems.

In a paper published in Science on Thursday (Sept. 8), biologists cite a critical lack of data on key biological mechanisms ?such as how animals and plants spread during their lifetime and how they evolve in response to changes in the

environment - as the main obstacle to improving models\\' ability to forecast species\\' response to climate change.

"This paper is a call to arms," said Patrick Zollner, article co-author and Purdue associate professor of wildlife science. "The world is in dire circumstances. We\\'re losing a lot of species, and we\\'re largely unaware why. How do we need to

rethink the kind of data we\\'re collecting so we can take advantage of modern modeling tools to understand the outcomes of climate change for ecological systems? This could help us forestall losing wildlife that we later deeply regret."

The group outlines two key problems that hinder the capability of current models to make realistic predictions about biological responses to climate change.

Most models are descriptive, based on statistical correlations and observations, and fail to capture the underlying processes that produce observed changes. For example, a descriptive model might show that lynx in the northern U.S. are

declining while bobcat populations in the same region are on the rise. Understanding what is driving this change requires a different sort of model, one that incorporates biological mechanisms. A mechanistic model that accounts for how

warming temperatures affect snow depth, for instance, could provide insights into why bobcats - better adapted to habitats with less snow - are gaining a competitive edge over lynx. But 77 percent of current models of climate change\\'s

impacts on wildlife do not include biological mechanisms.

Another challenge is that as models have grown in sophistication, they have far outpaced data collection. Put another way, a model is like a state-of-the-art kitchen, but the cupboards are bare.

"We can now build videogame-like environments with computers where we can create multiple versions of Earth and ask what the implications under different scenarios are," Zollner said. "But our ability to learn from these tools is constrained

by the kinds of data we have."

The group advanced several proposals on how to improve models, collect missing data and leverage available data to make broader predictions.

They identified six biological mechanisms that influence wildlife\\'s responses to climate change: physiology; demography and life history; evolutionary potential and adaptation; interactions between species; movement over land or water; and

responses to changes in the environment. They ranked the information needed to account for these mechanisms in models and suggested proxies for data that are missing or hard to collect.

A globally coordinated effort to fill data gaps could greatly advance improvements in models and informed conservation approaches, the researchers wrote. They point to the Intergovernmental Panel on Climate Change and its consistent

improvements in climate change modeling as a valuable blueprint for such a project.

But local and regional conservation groups need not wait for a global body to coalesce to start using a mechanistic approach in their own region, Zollner said "If the ideas put forth in this paper start to be adopted and integrated into climate

change work in a grass roots way, that could make a big difference in a region and could scale up over time," he said.

Citizen scientists also have an important role to play in pitching in with data collection, he said.

Working with citizen scientists offers "an opportunity to get huge amounts of data, and it\\'s foolish not to take advantage of it," Zollner said. "The data might not be as rigorous and needs to be treated differently, but it\\'s one more source of

valuable information.

Overall, the tone of the attached passages could best be described as ____.

A. discouraged but defiant: "`We haven\\'t been able to sufficiently determine what species composition future ecosystems will have...\\'"; optimistic but cautious: "`We can now build videogame-like environments with computers where we can create multiple versions of Earth and ask what the implications under different scenarios are.\\'"

B. uncertain and unachievable: "`We need to pull on our boots, grab our binoculars, and go back into the field to gather more detailed information if we are going to make realistic predictions\\'"; Defensive and dire: "`This paper is a call to arms...The world is in dire circumstances.\\'"

C. urgent but hopeful: "`We are at a triage stage at this point. We have limited resources and patients lined up at the door.\\'"; Serious but optimistic: "`If the ideas put forth in this paper start to be adopted and integrated into climate change work in a grass roots way, that could make a big difference in a region and could scale up over time,\\'..."

D. happy and reassuring: "Even a sampling of key species would be beneficial...as the more sophisticated models will allow scientists to extrapolate their predictions and apply them to multiple species with similar traits."; Defeated and hopeless: "Most models are descriptive, based on statistical correlations and observations, and fail to capture the underlying processes that produce observed changes."

Correct Answer: C

QUESTION 3

Victoria kept track of her weekly calorie intake, weight, and height. She summarized her results in the table shown here.

Week	Calories Consumed	Weight (pounds)	Height (feet\inches)
1	15400	108	4 feet 11 inches
2	16350	109	4 feet 11 inches
3	14210	107	4 feet 11 inches
4	14900	108	4 feet 11 inches
5	15800	109	4 feet 11 inches

Rafael is convinced that eating helps you grow taller and is puzzled by these results. Which of these statements could you use to help him understand these results?

1.

Victoria measured her height with a bad ruler.

2.

Five weeks might be too short a time to see an increase in height

3.

Victoria ate the wrong foods to stimulate growth.

4.

The results show correlation and not causation.

A. 1 and 3

B. 2 and 4

C. 1

D. 4

Correct Answer: B

QUESTION 4

FILL BLANK

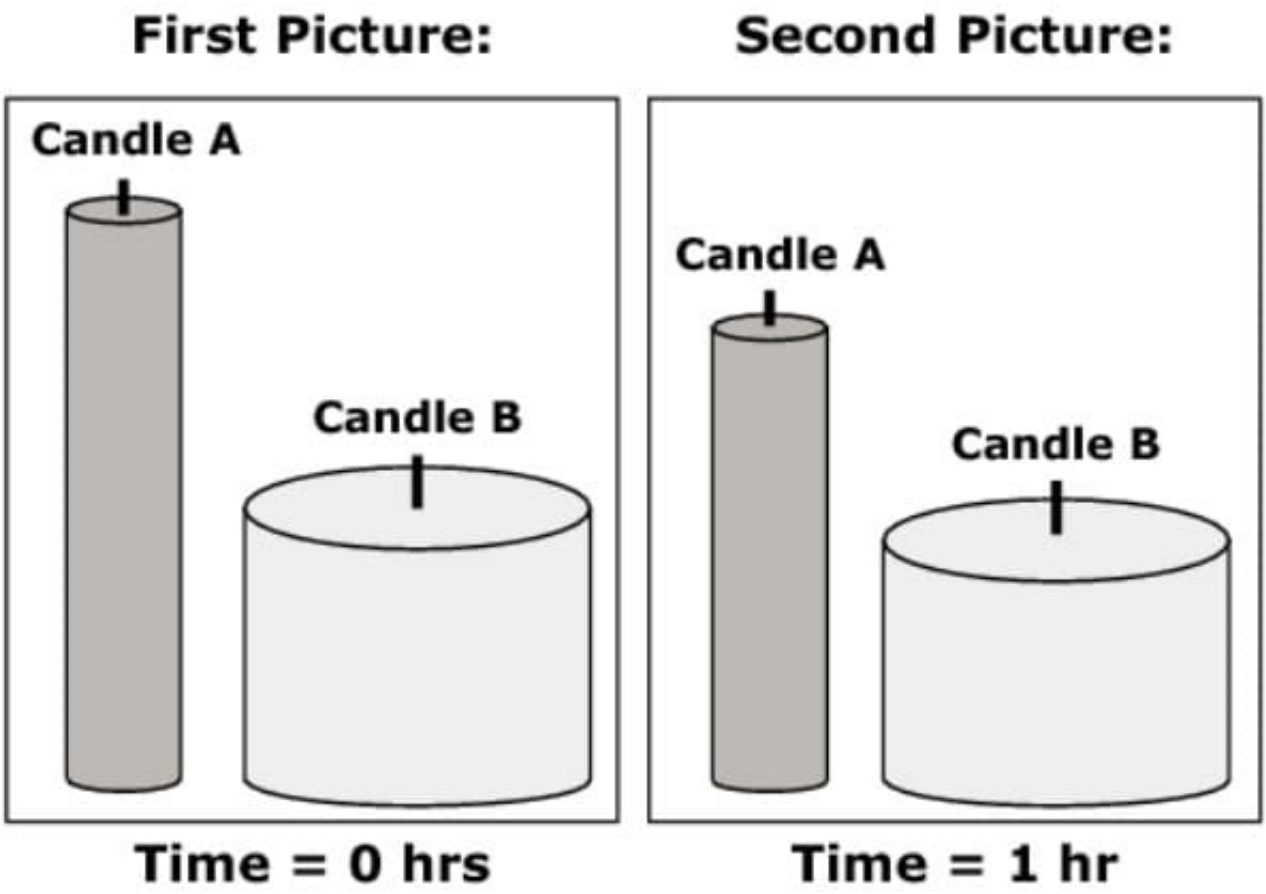
Case study

Lights, Candles, Action!

Your friend Abbie is making a movie. She is filming a fancy dinner scene and she has two types of candles on the table.

She wants to determine how long the candles will last.

She takes a picture, lights the candles, and then lets them burn for 1 hour. She then takes a second picture. You can assume that each candle burns at its won constant rate.



Candle Type A initial height = 20 cm

Candle Type B initial height = 10 cm Candle Type A height after burning for 1 hour = 16 cm Candle Type B height after burning for 1 hour = 9 cm

You will use this information to help Abbie think about the candles she might use for her film.

You have decided to use functions to help Abbie think about the candles.

You show her how to represent the height of a candle, h, as a function of time, t, using this equation:

h = k+ nt

First, explain to Abbie what k and n represent in order to model the different candles. Be specific in your explanation.

A.

See explanation below.

Correct Answer: A

2 points: The student correctly identifies that "k" represents the initial height of the candle and "n" represents the burn rate of the candle.

1 point: The student is only able to correctly identify one of the parameters, not both.

0 points: All other responses

Note: It is necessary for the student to identify "k" as the initial or original height in order to receive full credit, because the height of the candle changes as it burns and it is represented by "h" in the equation.

QUESTION 5

What is the vertex for y = x2 - 6x +13?

A. (-4,3)

B. (-3,4)

C. (3,4)

D. (4,3)

Correct Answer: B

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