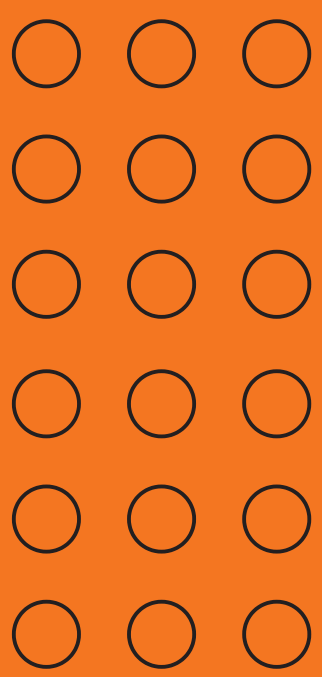


# COMPANION WITH FAITH

## READING GUIDE



**COMMAND OF  
EVIDENCE  
QUANTITATIVE**

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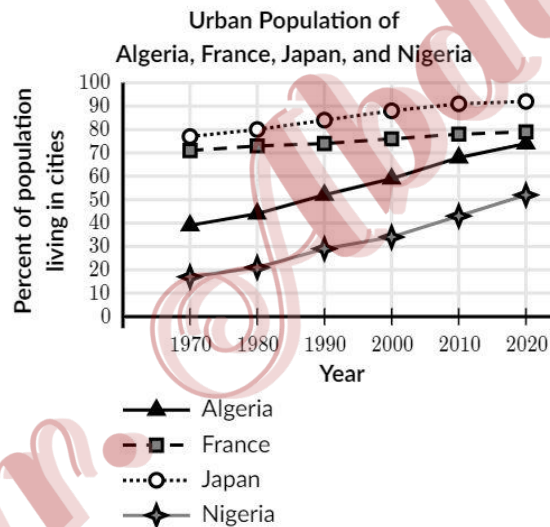
# Companion With Faith Reading Guide

## 2 COMMAND OF EVIDENCE: QUANTITATIVE

Some questions on the Reading and Writing section of the SAT will provide you a graph or table that contains data on an unfamiliar subject. The question will then provide some context for that data before asking you to effectively use information from the graph or table to complete a sentence.

Quantitative evidence questions will look like this:

1



The share of the world's population living in cities has increased dramatically since 1970, but this change has not been uniform. France and Japan, for example, were already heavily urbanized in 1970, with 70% or more of the population living in cities. The main contributors to the world's urbanization since 1970 have been countries like Algeria, whose population went from \_\_\_\_\_.

Which choice most effectively uses data from the graph to complete the assertion?

- A. less than 20% urban in 1970 to more than 50% urban in 2020.
- B. less than 40% urban in 1970 to around 90% urban in 2020.
- C. around 40% urban in 1970 to more than 70% urban in 2020.
- D. around 50% urban in 1970 to around 90% urban in 2020.

## How should we think about questions involving quantitative evidence?

The challenges of answering quantitative evidence questions can be split into three parts. Let's look at each challenge separately.

### Understanding The Argument

Every question requiring quantitative evidence will yield more details than we require. Knowing what data to search for will help us avoid being distracted by all the extra details and locate the answer more quickly, which is one of the secrets to properly answering these questions.

Reading the prompt text carefully is the best method to accomplish this. The context we need to interpret the data in the graph or table will be provided in this paragraph. The argument that our quantitative evidence must support will also be outlined in this paragraph.

The key component of the question is this argument. Whatever information we choose to utilize to finish the sentence must give evidence for that claim. It instructs us on what to search for, in other words.

### Reading The Data

A quantitative evidence question may be presented in a number of different ways. A table, a bar graph, a line graph, or any number of other forms that can be used to visually display data may be included in the question.

Fortunately, you've probably already come across all of these data visualization styles in your math and science classes. This knowledge will aid you in accurately reading graphs and tables on test day.

**Remember, though:** Tables and graphs will provide more information than you need, so you will have to read around and sift through it. Your eyes may easily wander if you're working quickly or switching between the question and the graph. Double check that you're looking in the right place and at the right data.

## **Evaluating The Choices**

Quantitative evidence questions will offer two different types of incorrect choices alongside the correct answer.

- **False Statements**

The data in the graph or table indicates that these choices are false.  
They misinterpret or misread data.

- **True statements**

These options are correct in light of the data in the graph or table. They offer facts with accuracy, but they don't back up their claims with direct evidence.

False statements are easy to eliminate. Simply compare the choice's claim to the graph's information. If those factors conflict, you can rule out that choice.

Handling true statements, however, is more difficult. You must determine if they are true or false rather than whether the paragraph's argument is supported by them. Therefore, it's crucial to succeed at the first challenge, which is "understanding the argument."

## **How should you handle questions involving quantitative evidence?**

Consider using the following steps to answer a quantitative evidence question:

### **Step 1: *Skim the graph***

As you don't know what data to look for, you don't need to go too deeply into the graph or table just yet. It can be helpful to acquaint yourself with the contents of the graph or table, though. The title, labels, units, and key are all readable. These ought to provide you with a thorough understanding of the contents of the graph without requiring a lot of your time.

### **Step 2: *Read the paragraph***

Sometimes, as in our example question, the text will clearly guide you in the direction of a particular piece of knowledge: a certain period of time, location, or circumstances that can be located in the graph or table. In these situations, you may easily spot the accurate data in the graph or table and/or compare your choices to the provided data.

In other cases, the text will make a general argument, and you'll need to choose data to back up it. You won't be able to simply extract the relevant information from the graph in these situations because there may be several pieces of information that could potentially be used as evidence. The best course of action in this situation is to provide a brief summary of the argument being made. Then you may compare that summary to each choice to evaluate which offers strong evidence.

### **Step 3: *Validate the choices***

As we identified earlier, quantitative evidence choices can contain both true statements and false statements.

Read the choices and check them against the information in the graph. Are the choices true or false?

- If they're false, eliminate the false choices.
- If they're true, proceed to step 4.

#### Step 4: Find the best evidence

Any statements that are false on the graph or table should have been eliminated once you've checked the options. This leaves you with options that are true but may not effectively support the text's argument.

Compare your argument's summary to each of the remaining options. There is just one option that will directly support that argument. You can confidently choose this option.

Back to the question, This graph contains a lot of information, as does the paragraph. Let's simplify things by focusing on just the sentence we've been asked to complete:

*“The main contributors to the world’s urbanization since 1970 have been countries like Algeria, whose population went from \_\_\_\_\_”*

So while the graph offers information about several countries, we only need to find data about **Algeria**.

A quick glance at the choices shows that we're looking to compare the data for Algeria in two years: **1970** and **2020**.

The key to the graph shows us that Algeria's data is marked by a triangle and a solid line. According to the graph:

- Algeria's urban population in 1970 looks to be around **40%**
- Algeria's urban population in 2020 looks to be around **75%**

Only choice C accurately reflects this data. **Choice C is the answer.**

### Necessary Key Notes:

- **Use your finger/cursor**

Your eyes are likely to wander when looking at a graph or table with numerous data points. You may prevent making foolish errors by putting your finger or your mouse precisely over the information you're looking for.

- **Check if the choices are true or false**

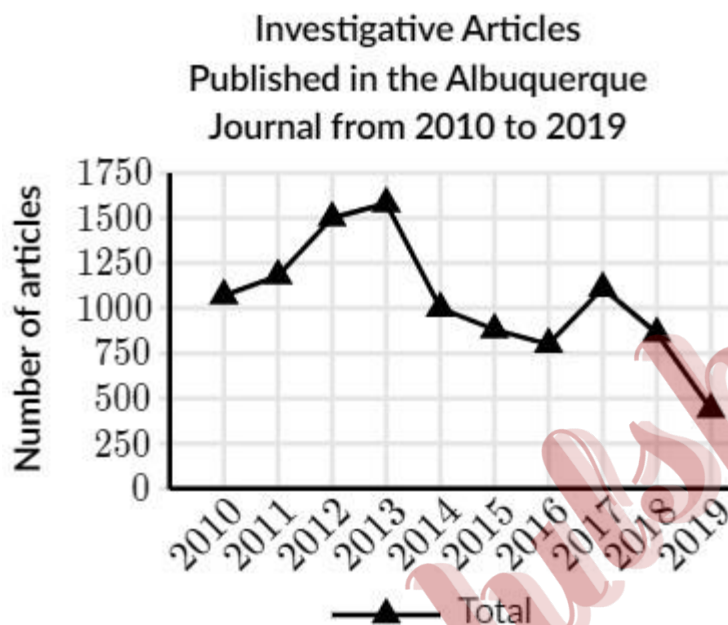
Typically, if one wrong choice makes a false statement, all the wrong choices to that question will also make false statements. And when one erroneous decision is accurate, they are all correct.

Making this determination early can be beneficial because it changes the nature of your assignment. You can quickly eliminate your way to the right answer if the options are untrue. You'll need to consider the argument more carefully if the selections are accurate.



## COMMAND OF EVIDENCE: QUANTITATIVE QUESTIONNAIRE

1



Investigative journalists research and report about fraud, corruption, public hazards, and more. The graph shows the number of investigative articles published in the Albuquerque Journal newspaper from 2010 to 2019. According to an analyst, although the number of investigative articles published in this newspaper has varied significantly over the period shown, the number overall has fallen since 2010.

Which choice most effectively uses data from the graph to justify the underlined claim?

- A. The newspaper published approximately 1,000 investigative articles in 2010 and approximately 500 in 2019.
- B. The smallest annual number of investigative articles published in the newspaper during the period shown is approximately 1,600 in 2013.
- C. The greatest annual number of investigative articles published in the newspaper during the period shown is approximately 1,000 in 2017.
- D. The newspaper published approximately 1,000 investigative articles in 2010 and approximately 1,600 in 2013.

Additional Notes

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## CLASSWORK

2

### Correlations Between Congestion Ratings and Features of the Crowd in Raters' Immediate Vicinity

Crowd feature	Before obstacle	After obstacle	Overall
Density	0.8592	0.7308	0.7447
Velocity	-0.9357	-0.9518	-0.8587

Researcher Xiaolu Jia and colleagues monitored individuals' velocity and the surrounding crowd density as a group of study participants walked through a space and navigated around an obstacle. Participants rated how congested it seemed before the obstacle, after the obstacle, and overall, and the researchers correlated those ratings with velocity and density. (Correlations range from  $-1$  to  $1$ , with greater distance from  $0$  indicating greater strength). The researchers concluded that the correlations with velocity are stronger than those with density.

Which choice best describes data from the table that support the researchers' conclusion?

- A. The correlation between congestion ratings before the obstacle and density is further from  $0$  than the correlation between overall congestion rating and velocity is.
- B. The correlation between congestion ratings before the obstacle and velocity is further from  $0$  than the correlation between congestion overall and velocity is.
- C. For each of the three ratings, the correlation with velocity is negative while the correlation with density is positive.
- D. For each of the three ratings, correlations with velocity are further from  $0$  than the corresponding correlations with density are.

Additional Notes

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## CLASSWORK

3

### Average Nitrate and Phosphate Concentrations in Seawater after Volcanic Eruption

Nutrient	Seawater in lava-affected area, 5 – 45 meters below surface	Seawater in lava-affected area, 75 – 125 meters below surface	Seawater outside of lava-affected area, 5 – 45 meters below surface	Seawater outside of lava-affected area, 7 – 125 meters below surface
Nitrate (micromoles per liter)	3.1	0.4	$\leq 0.03$	$\leq 0.01$
Phosphate (micromoles per liter)	0.17	0.09	0.14	0.06

After a volcanic eruption spilled lava into North Pacific Ocean waters, a dramatic increase of diatoms (a kind of phytoplankton) near the surface occurred. Scientists assumed the diatoms were thriving on nutrients such as phosphate from the lava, but analysis showed these nutrients weren't present near the surface in forms diatoms can consume. However, there was an abundance of usable nitrate, a nutrient usually found in much deeper water and almost never found in lava. Microbial oceanographer Sonya Dyhrman and colleagues believe that as the lava plunged nearly 300 meters below the surface it dislodged pockets of this nutrient, releasing it to float upward, given that \_\_\_\_\_

Which choice most effectively uses data from the table to complete the statement?

- A. at 5–45 meters below the surface, the average concentration of phosphate was about the same in the seawater in the lava-affected area as in the seawater outside of the lava-affected area.
- B. for both depth ranges measured, the average concentrations of nitrate were substantially higher in the seawater in the lava-affected area than in the seawater outside of the lava-affected area.
- C. for both depth ranges measured in the seawater in the lava-affected area, the average concentrations of nitrate were substantially higher than the average concentrations of phosphate.
- D. in the seawater outside of the lava-affected area, there was little change in the average concentration of nitrate from 75–125 meters below the surface to 5–45 meters below the surface.

Additional Notes

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## CLASSWORK

4

### Comfort Ratings and Temperature-Adjustment Preferences from One Survey

Participant	Comfort rating	Preferred temperature adjustment
20	-2	Cooler
1	1	Cooler
21	1	Cooler

Nan Gao and her team conducted multiple surveys to determine participants' levels of comfort in a room where the temperature was regulated by a commercial climate control system. Participants filled out surveys several times a day to indicate their level of comfort on a scale from -3 (very cold) to +3 (very hot), with 0 indicating neutral (neither warm nor cool), and to indicate how they would prefer the temperature to be adjusted. The table shows three participants' responses in one of the surveys. According to the table, all three participants wanted the room to be cooler, \_\_\_\_\_

Which choice most effectively uses data from the table to complete the statement?

- A. and they each reported the same level of comfort.
- B. even though each participant's ratings varied throughout the day.
- C. but participant 20 reported feeling significantly colder than the other two participants did.
- D. but participant 1 reported feeling warmer than the other two participants did.

Additional Notes

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77

## CLASSWORK

5

### Distribution of Ecosystem Services Affected by Invasive Species by Service Type

Region (Overall)	Provisioning (75%)	Regulating (21%)	Cultural (4%)
West	73%	27%	0%
North	88%	12%	0%
South	79%	14%	7%
East	83%	6%	11%
Central	33%	67%	0%

To assess the impact of invasive species on ecosystems in Africa, Benis N. Egoh and colleagues reviewed government reports from those nations about how invasive species are undermining ecosystem services (aspects of the ecosystem on which residents depend). The services were sorted into three categories: provisioning (material resources from the ecosystem), regulating (natural processes such as cleaning the air or water), and cultural (nonmaterial benefits of ecosystems). Egoh and her team assert that countries in each region reported effects on provisioning services and that provisioning services represent the majority of the reported services.

Which choice best describes data from the table that support Egoh and colleagues' assertion?

- A. Provisioning services represent 73% of the services reported for the West region and 33% of those for the Central region, but they represent 75% of the services reported overall.
- B. None of the percentages shown for provisioning services are lower than 33%, and the overall percentage shown for provisioning services is 75%.
- C. Provisioning services are shown for each region, while no cultural services are shown for some regions.
- D. The greatest percentage shown for provisioning services is 88% for the North region, and the least shown for provisioning services is 33% for the Central region.

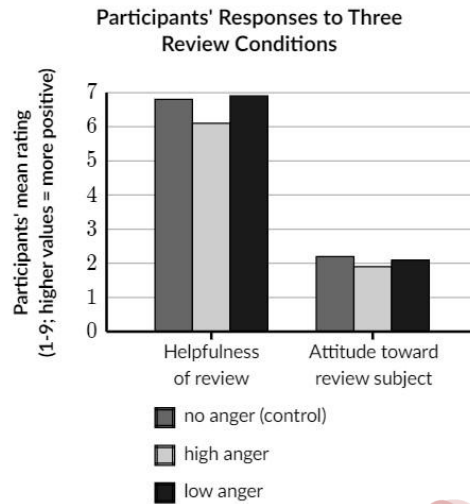
Additional Notes

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To understand how expressions of anger in reviews of products affect readers of those reviews, business scholar Dezhi Yin and colleagues measured study participants' responses to three versions of the same negative review—a control review expressing no anger, a review expressing a high degree of anger, and a review expressing a low degree of anger. Reviewing the data, a student concludes that the mere presence of anger in a review may not negatively affect readers' perceptions of the review, but a high degree of anger in a review does worsen readers' perceptions of the review.

Which choice best describes data from the graph that support the student's conclusion?

- A. On average, participants' ratings of the helpfulness of the review were substantially higher than were participants' ratings of the reviewed product regardless of which type of review participants had seen.
- B. Compared with participants who saw the control review, participants who saw the low-anger review rated the review as slightly more helpful, whereas participants who saw the high-anger review rated the review as less helpful.
- C. Participants who saw the low-anger review rated the review as slightly more helpful than participants who saw the control review did, but participants' attitude toward the reviewed product was slightly worse when participants saw the low-anger review than when they saw the no-anger review.
- D. Compared with participants who saw the low-anger review, participants who saw the high-anger review rated the review as less helpful and had a less positive attitude toward the reviewed product.

Additional Notes

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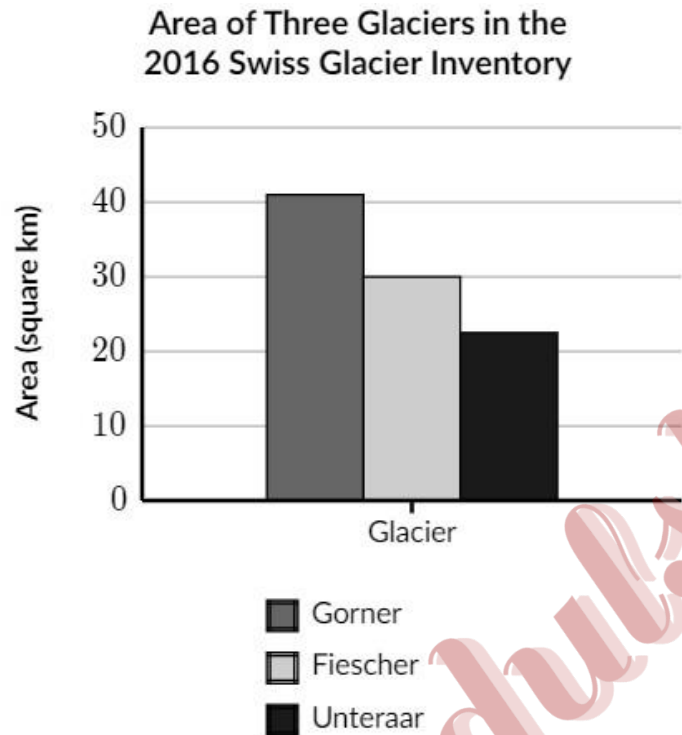
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## CLASSWORK

7



To monitor changes to glaciers in Switzerland, the government periodically measures them for features like total area of ice and mean ice thickness, which are then reported in the Swiss Glacier Inventory. These measurements can be used to compare the glaciers. For example, the Gorner glacier had \_\_\_\_\_

Which choice most effectively uses data from the graph to complete the example?

- A. a larger area than either the Fiescher glacier or the Unteraar glacier.
- B. a smaller area than the Fiescher glacier but a larger area than the Unteraar glacier.
- C. a smaller area than either the Fiescher glacier or the Unteraar glacier.
- D. a larger area than the Fiescher glacier but a smaller area than the Unteraar glacier.

Additional Notes

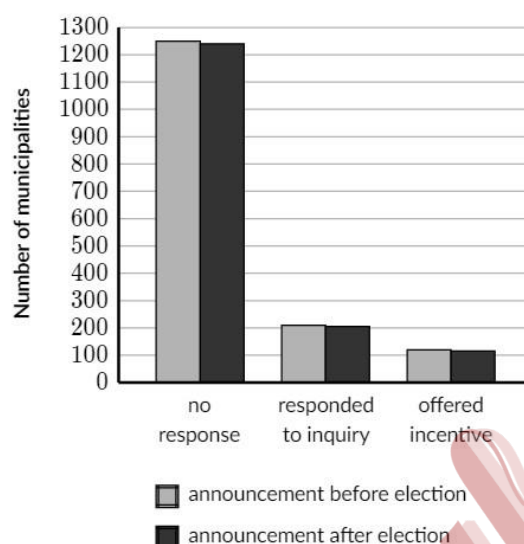
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Municipalities' Responses to Inquiries about Potential Incentives for Firm



In the United States, firms often seek incentives from municipal governments to expand to those municipalities. A team of political scientists hypothesized that municipalities are much more likely to respond to firms and offer incentives if expansions can be announced in time to benefit local elected officials than if they can't. The team contacted officials in thousands of municipalities, inquiring about incentives for a firm looking to expand and indicating that the firm would announce its expansion on a date either just before or just after the next election.

Which choice best describes data from the graph that weaken the team's hypothesis?

- A. A large majority of the municipalities that received an inquiry mentioning plans for an announcement before the next election didn't respond to the inquiry.
- B. The proportion of municipalities that responded to the inquiry or offered incentives didn't substantially differ across the announcement timing conditions.
- C. Only around half the municipalities that responded to inquiries mentioning plans for an announcement before the next election offered incentives.
- D. Of the municipalities that received an inquiry mentioning plans for an announcement date after the next election, more than 1,200 didn't respond and only around 100 offered incentives.

Additional Notes

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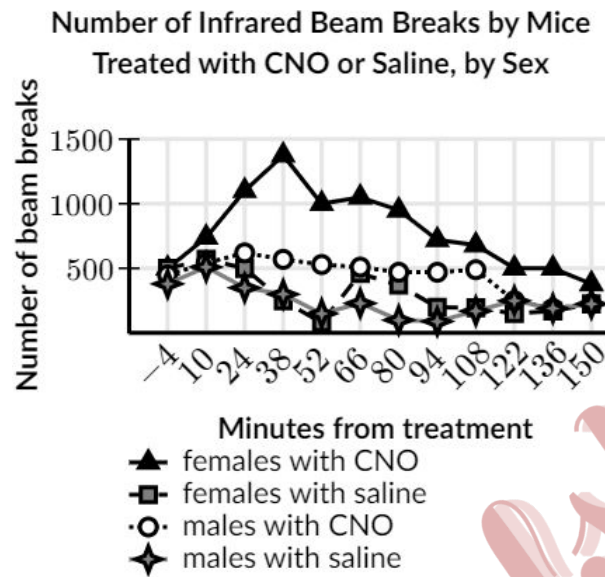


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## CLASSWORK

9



To investigate the influence of certain estrogen-responsive neurons on energy expenditure, biologist Stephanie Correa et al. treated female and male mice with either saline solution or clozapine-N4-oxide (CNO), which activates the neurons. Monitoring the activity levels of the mice by measuring how frequently the animals broke infrared beams crossing their enclosures, Correa et al. found that the mice in their study showed sex-specific differences in response to neuron activation: \_\_\_\_\_

Which choice most effectively uses data from the graph to complete the assertion?

- A. the four groups of mice differed greatly in their activity levels before treatment but showed identical activity levels at the end of the monitoring period.
- B. CNO-treated females showed a substantial increase and then decline in activity over the monitoring period, whereas CNO-treated males showed a substantial decline in activity followed by a steep increase.
- C. saline-treated females showed substantially more activity at certain points in the monitoring period than saline-treated males did.
- D. CNO-treated females showed more activity relative to saline-treated females than CNO-treated males showed relative to saline-treated males.

Additional Notes

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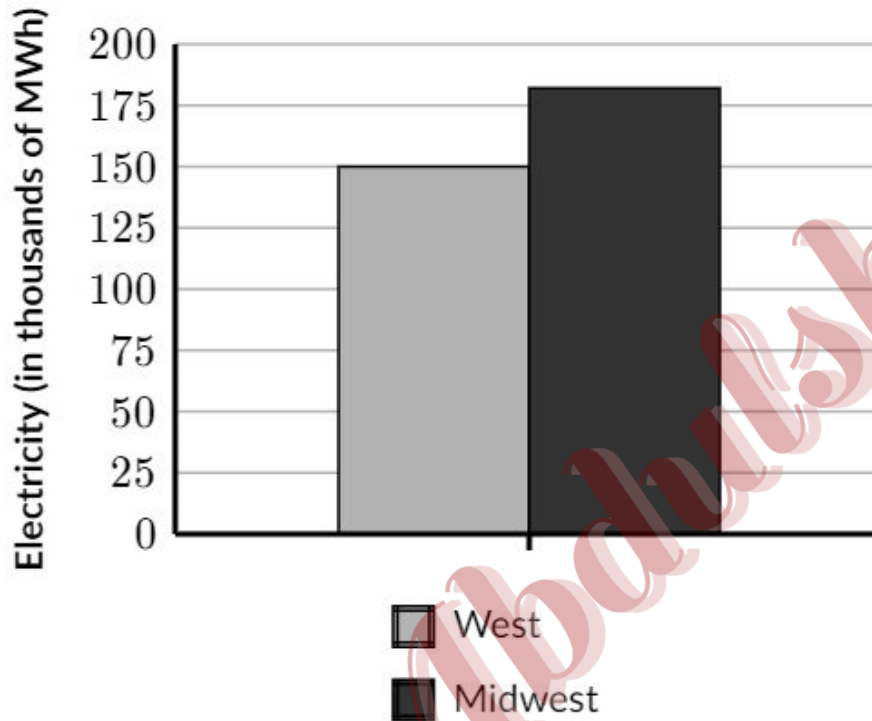
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## HOMEWORK

10

### Amount of Additional Electricity Wind Turbines Could Generate When Winds Were Stronger Than Forecast



Electric companies that use wind turbines rely on weather forecasts to predict the maximum amount of power, in megawatt-hours (MWh), they can generate using wind so that they can determine how much they'll need to generate from other sources. When winds are stronger than they were forecast to be, however, the predicted maximum amount of electricity wind turbines could generate will be too low. For example, the graph shows that for the West region, the winds were \_\_\_\_\_

Which choice most effectively uses data from the graph to complete the example?

- A. strong enough to generate about 150 thousand more MWh of electricity from wind turbines.
- B. so weak that the electricity from wind turbines was about 175 thousand MWh less than predicted.
- C. so weak that the electricity from wind turbines was about 150 thousand MWh less than predicted.
- D. strong enough to generate about 175 thousand more MWh of electricity from wind turbines.

## HOMEWORK

11

### **Tadpole Body Mass and Toxin Production after Three Weeks in Ponds**

Population density	Average tadpole body mass (milligrams)	Average number of distinct bufadienolide toxins per tadpole	Average amount of bufadienolide per tadpole (nanograms)	Average bufadienolide concentration (nanograms per milligram of tadpole body mass)
High	193.87	22.69	5,815.51	374.22
Medium	254.56	21.65	5,525.72	230.10
Low	258.97	22.08	4,664.99	171.43

Ecologist Veronika Bókony and colleagues investigated within-species competition among common toads (*Bufo bufo*), a species that secretes various unpleasant-tasting toxins called bufadienolides in response to threats. The researchers tested *B. bufo* tadpoles' responses to different levels of competition by creating ponds with different tadpole population densities but a fixed amount of food. Based on analysis of the tadpoles after three weeks, the researchers concluded that increased competition drove bufadienolide production at the expense of growth.

Which choice uses data from the table to most effectively support the researchers' conclusion?

- A. The difference in average tadpole body mass was small between the low and medium population density conditions and substantially larger between the low and high population density conditions.
- B. Tadpoles in the low and medium population density conditions had substantially lower average bufadienolide concentrations but had greater average body masses than those in the high population density condition.
- C. Tadpoles in the high population density condition displayed a relatively modest increase in the average amount of bufadienolide but roughly double the average bufadienolide concentration compared to those in the low population density condition.
- D. Tadpoles produced approximately the same number of different bufadienolide toxins per individual across the population density conditions, but average tadpole body mass decreased as population density increased.

Additional Notes

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## HOMEWORK

12

### Effect of Paywall Introduction on Newspaper Companies' Revenues

Newspaper	Total revenue change (\$ in thousands)	Percentage change (%)	Newspaper size
<i>Los Angeles Times</i>	93,966	12.5	large
<i>The New York Times</i>	235,788	20	large
<i>The Denver Post</i>	-3,765	-1	small
<i>Sun Sentinel</i>	-24,899	-11.9	small
<i>Chicago Tribune</i>	94,492	19	large

Digital paywalls restrict access to online content to those with a paid subscription. In an investigation of the effect of paywalls on newspaper company revenues for print and digital subscriptions and advertising, Doug J. Chung and colleagues compared actual outcomes (with a paywall) to control estimates (without a paywall). The researchers concluded that introducing a paywall is generally more beneficial for larger newspapers, which have high circulation and tend to offer a substantial amount of unique online content.

Which choice best describes data from the table that support Chung and colleagues' conclusion?

- A. The Chicago Tribune and the Los Angeles Times had similar total revenue changes, but the Los Angeles Times had a smaller percentage change.
- B. The Los Angeles Times had a 12.5% revenue change, while the Chicago Tribune had a 19% revenue change.
- C. The New York Times had a 20% revenue change, while The Denver Post had a -1% revenue change.
- D. The Denver Post had only a -1% revenue change, which was the smallest percentage change of the selected companies.

Additional Notes

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## HOMEWORK

13

### **Credited Film Output of James Young Deer, Dark Cloud, Edwin Carewe, and Lillian St. Cyr**

Individual	Years active	Number of films known and commonly credited
James Young Deer	1909–1924	33 (actor), 35 (director), 10 (writer)
Dark Cloud	1910–1920	35 (actor), 1 (writer)
Edwin Carewe	1912–1934	47 (actor), 58 (director), 20 (producer), 4 (writer)
Lillian St. Cyr (Red Wing)	1908–1921	66 (actor)

Some researchers studying Indigenous actors and filmmakers in the United States have turned their attention to the early days of cinema, particularly the 1910s and 1920s, when people like James Young Deer, Dark Cloud, Edwin Carewe, and Lillian St. Cyr (known professionally as Red Wing) were involved in one way or another with numerous films. In fact, so many films and associated records for this era have been lost that counts of those four figures' output should be taken as bare minimums rather than totals; it's entirely possible, for example, that \_\_\_\_\_

Which choice most effectively uses data from the table to complete the example?

- A. Dark Cloud acted in significantly fewer films than did Lillian St. Cyr, who is credited with 66 performances.
- B. Edwin Carewe's 47 credited acting roles includes only films made after 1934.
- C. Lillian St. Cyr acted in far more than 66 films and Edwin Carewe directed more than 58.
- D. James Young Deer actually directed 33 films and acted in only 10.

Additional Notes

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## HOMEWORK

14

### Juvenile Plants Found Growing on Bare Ground and in Patches of Vegetation for Five Species

Species	Bare ground	Patches of vegetation	Total	Percent found in patches of vegetation
<i>T. moroderi</i>	9	13	22	59.1%
<i>T. libanitis</i>	83	120	203	59.1%
<i>H. syriacim</i>	95	106	201	52.7%
<i>H. squamatum</i>	218	321	539	59.6%
<i>H. stoechas</i>	11	12	23	52.2%

Alicia Montesinos-Navarro, Isabelle Storer, and Rocío Perez-Barrales recently examined several plots within a diverse plant community in southeast Spain. The researchers calculated that if individual plants were randomly distributed on this particular landscape, only about 15% would be with other plants in patches of vegetation. They counted the number of juvenile plants of five species growing in patches of vegetation and the number growing alone on bare ground and compared those numbers to what would be expected if the plants were randomly distributed. Based on these results, they claim that plants of these species that grow in close proximity to other plants gain an advantage at an early developmental stage.

Which choice best describes data from the table that support the researchers' claim?

- A. For all five species, less than 75% of juvenile plants were growing in patches of vegetation.
- B. The species with the greatest number of juvenile plants growing in patches of vegetation was *H. stoechas*.
- C. For *T. libanitis* and *T. moroderi*, the percentage of juvenile plants growing in patches of vegetation was less than what would be expected if plants were randomly distributed.
- D. For each species, the percentage of juvenile plants growing in patches of vegetation was substantially higher than what would be expected if plants were randomly distributed.

Additional Notes

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## HOMEWORK

15

### Approximate Rates of Speech and Information Conveyed for Five Languages

Language	Rate of speech (syllables per second)	Rate of information conveyed (bits per second)
Serbian	7.2	39.1
Spanish	7.7	42.0
Vietnamese	5.3	42.5
Thai	4.7	33.8
Hungarian	5.9	34.6

A group of researchers working in Europe, Asia, and Oceania conducted a study to determine how quickly different Eurasian languages are typically spoken (in syllables per second) and how much information they can effectively convey (in bits per second). They found that, although languages vary widely in the speed at which they are spoken, the amount of information languages can effectively convey tends to vary much less. Thus, they claim that two languages with very different spoken rates can nonetheless convey the same amount of information in a given amount of time.

Which choice best describes data from the table that support the researchers' claim?

- A. Among the five languages in the table, Thai and Hungarian have the lowest rates of speech and the lowest rates of information conveyed.
- B. Vietnamese conveys information at approximately the same rate as Spanish despite being spoken at a slower rate.
- C. Among the five languages in the table, the language that is spoken the fastest is also the language that conveys information the fastest.
- D. Serbian and Spanish are spoken at approximately the same rate, but Serbian conveys information faster than Spanish does.

Additional Notes

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## HOMEWORK

16

### **Employment by Sector in France and the United States, 1800–2012 (% of total employment)**

Year	Agriculture in France	Manufacturing in France	Services in France	Agriculture in US	Manufacturing in US	Services in US
1800	64	22	14	68	18	13
1900	43	29	28	41	28	31
1950	32	33	35	14	33	53
2012	3	21	76	2	18	80

Rows in table may not add up to 100 due to rounding.

Over the past two hundred years, the percentage of the population employed in the agricultural sector has declined in both France and the United States, while employment in the service sector (which includes jobs in retail, consulting, real estate, etc.) has risen. However, this transition happened at very different rates in the two countries. This can be seen most clearly by comparing the employment by sector in both countries in \_\_\_\_\_

Which choice most effectively uses data from the table to complete the statement?

- A. 1900 with the employment by sector in 1950.
- B. 1800 with the employment by sector in 2012.
- C. 1900 with the employment by sector in 2012.
- D. 1800 with the employment by sector in 1900.

Additional Notes

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## HOMEWORK

17



Considering a large sample of companies, economics experts Maria Guadalupe, Julie Wulf, and Raghuram Rajan assessed the number of managers and leaders from different departments who reported directly to a chief executive officer (CEO). According to the researchers, the findings suggest that across the years analyzed, there was a growing interest among CEOs in connecting with more departments in their companies.

Which choice best describes data from the graph that support the researchers' conclusion?

- A. The average numbers of managers and department leaders reporting directly to their CEO didn't fluctuate from the 1991-1995 period to the 2001-2008 period.
- B. The average number of managers reporting directly to their CEO was highest in the 1996-2001 period.
- C. The average number of department leaders reporting directly to their CEO was greater than the average number of managers reporting directly to their CEO in each of the three periods studied.
- D. The average number of department leaders reporting directly to their CEO rose over the three periods studied.

Additional Notes

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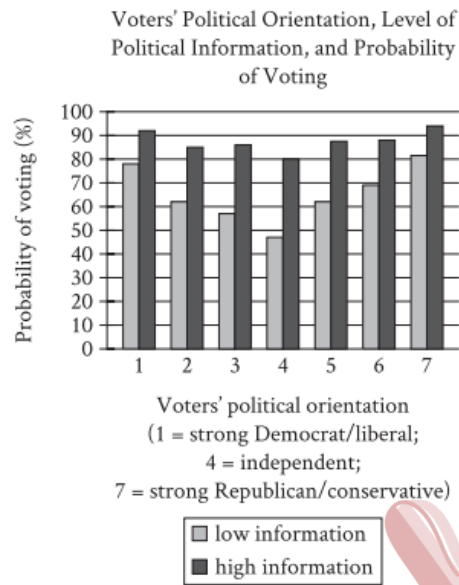
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## HOMEWORK

18



Economists Kerwin Kofi Charles and Melvin Stephens Jr. investigated a variety of factors that influence voter turnout in the United States. Using survey data that revealed whether respondents voted in national elections and how knowledgeable respondents are about politics, Charles and Stephens claim that the likelihood of voting is driven in part by potential voters' confidence in their assessments of candidates—essentially, the more informed voters are about politics, the more confident they are at evaluating whether candidates share their views, and thus the more likely they are to vote.

Which choice best describes data in the graph that support Charles and Stephens's claim?

- A. At each point on the political orientation scale, high-information voters were more likely than low-information voters to vote.
- B. Only low-information voters who identify as independents had a voting probability below 50%.
- C. The closer that low-information voters are to the ends of the political orientation scale, the more likely they were to vote.
- D. High-information voters were more likely to identify as strong Democrats or strong Republicans than low-information voters were.

Additional Notes

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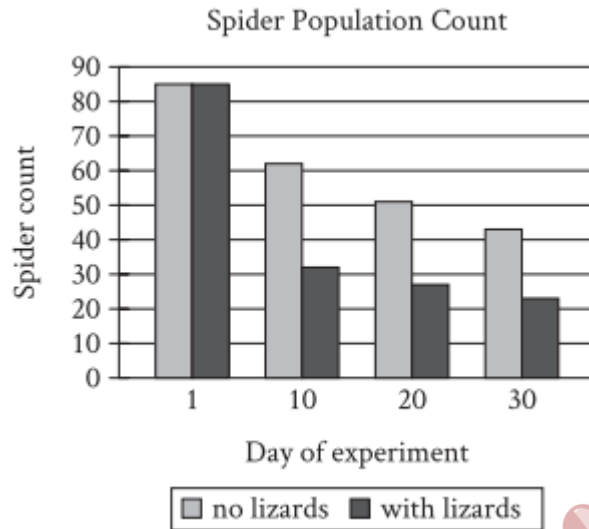
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## EXTRA PRACTICE

19



To investigate the effect of lizard predation on spider populations, a student in a biology class placed spiders in two enclosures, one with lizards and one without, and tracked the number of spiders in the enclosures for 30 days. The student concluded that the reduction in the spider population count in the enclosure with lizards by day 30 was entirely attributable to the presence of the lizards.

Which choice best describes data from the graph that weaken the student's conclusion?

- A. The spider population count was the same in both enclosures on day 1.
- B. The spider population count also substantially declined by day 30 in the enclosure without lizards
- C. The largest decline in spider population count in the enclosure with lizards occurred from day 1 to day 10.
- D. The spider population count on day 30 was lower in the enclosure with lizards than in the enclosure without lizards.

Additional Notes

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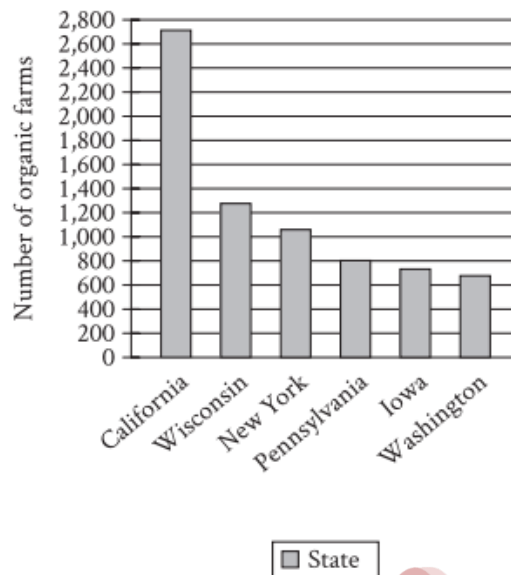
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## EXTRA PRACTICE

20

US States with the Greatest Number of Organic Farms in 2016



Organic farming is a method of growing food that tries to reduce environmental harm by using natural forms of pest control and avoiding fertilizers made with synthetic materials. Organic farms are still a small fraction of the total farms in the United States, but they have been becoming more popular. According to the US Department of Agriculture, in 2016 California had between 2,600 and 2,800 organic farms and

Which choice most effectively uses data from the graph to complete the text?

- A. Washington had between 600 and 800 organic farms.
- B. New York had fewer than 800 organic farms.
- C. Wisconsin and Iowa each had between 1,200 and 1,400 organic farms.
- D. Pennsylvania had more than 1,200 organic farms.

Additional Notes

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## EXTRA PRACTICE

21

### Ablation Rates for Three Elements in Cosmic Dust, by Dust Source

Element	SPC	AST	HTC	OCC
iron	20%	28%	90%	98%
potassium	44%	74%	97%	100%
sodium	45%	75%	99%	100%

Earth's atmosphere is bombarded by cosmic dust originating from several sources: short-period comets (SPCs), particles from the asteroid belt (ASTs), Halley-type comets (HTCs), and Oort cloud comets (OCCs). Some of the dust's material vaporizes in the atmosphere in a process called ablation, and the faster the particles move, the higher the rate of ablation. Astrophysicist Juan Diego Carrillo-Sánchez led a team that calculated average ablation rates for elements in the dust (such as iron and potassium) and showed that material in slowermoving SPC or AST dust has a lower rate than the same material in faster-moving HTC or OCC dust. For example, whereas the average ablation rate for iron from AST dust is 28%, the average rate for \_\_\_\_\_

Which choice most effectively uses data from the table to complete the example?

- A. iron from SPC dust is 20%.
- B. sodium from OCC dust is 100%.
- C. iron from HTC dust is 90%.
- D. sodium from AST dust is 75%

Additional Notes

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## EXTRA PRACTICE

22

### Effects of Mycorrhizal Fungi on 3 Plant Species

Plant species	Mycorrhizal host	Average mass of plants grown in soil containing mycorrhizal fungi (in grams)	Average mass of plants grown in soil treated to kill fungi (in grams)
Corn	yes	15.1	3.8
Marigold	yes	10.2	2.4
Broccoli	no	7.5	7

Mycorrhizal fungi in soil benefits many plants, substantially increasing the mass of some. A student conducted an experiment to illustrate this effect. The student chose three plant species for the experiment, including two that are mycorrhizal hosts (species known to benefit from mycorrhizal fungi) and one nonmycorrhizal species (a species that doesn't benefit from and may even be harmed by mycorrhizal fungi). The student then grew several plants from each species both in soil containing mycorrhizal fungi and in soil that had been treated to kill mycorrhizal and other fungi. After several weeks, the student measured the plants' average mass and was surprised to discover that \_\_\_\_\_

Which choice most effectively uses data from the table to complete the statement?

- A. broccoli grown in soil containing mycorrhizal fungi had a slightly higher average mass than broccoli grown in soil that had been treated to kill fungi.
- B. corn grown in soil containing mycorrhizal fungi had a higher average mass than broccoli grown in soil containing mycorrhizal fungi.
- C. marigolds grown in soil containing mycorrhizal fungi had a much higher average mass than marigolds grown in soil that had been treated to kill fungi.
- D. corn had the highest average mass of all three species grown in soil that had been treated to kill fungi, while marigolds had the lowest.

Additional Notes

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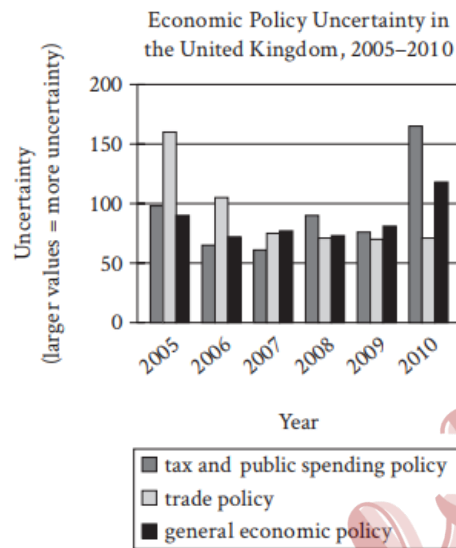
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## EXTRA PRACTICE

23



High levels of public uncertainty about which economic policies a country will adopt can make planning difficult for businesses, but measures of such uncertainty have not tended to be very detailed. Recently, however, economist Sandile Hlatshwayo analyzed trends in news reports to derive measures not only for general economic policy uncertainty but also for uncertainty related to specific areas of economic policy, like tax or trade policy. One revelation of her work is that a general measure may not fully reflect uncertainty about specific areas of policy, as in the case of the United Kingdom, where general economic policy uncertainty \_\_\_\_\_

Which choice most effectively uses data from the graph to illustrate the claim?

- A. aligned closely with uncertainty about tax and public spending policy in 2005 but differed from uncertainty about tax and public spending policy by a large amount in 2009.
- B. was substantially lower than uncertainty about tax and public spending policy each year from 2005 to 2010.
- C. reached its highest level between 2005 and 2010 in the same year that uncertainty about trade policy and tax and public spending policy reached their lowest levels.
- D. was substantially lower than uncertainty about trade policy in 2005 and substantially higher than uncertainty about trade policy in 2010.

Additional Notes

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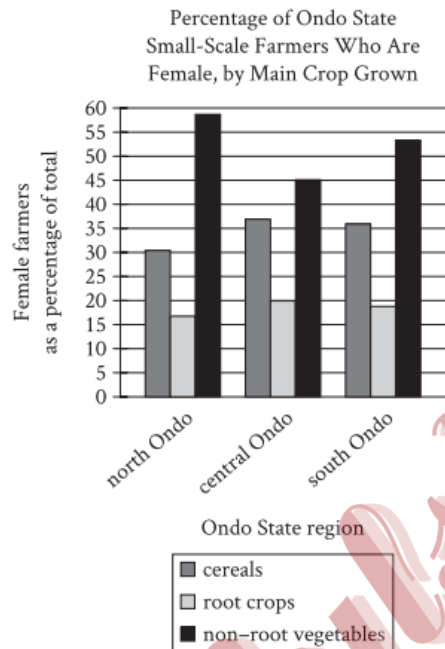
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## EXTRA PRACTICE

24



Geographer Adebayo Oluwole Eludoyin and his colleagues surveyed small-scale farmers in three locations in Ondo State, Nigeria—which has mountainous terrain in the north, an urbanized center, and coastal terrain in the south—to learn more about their practices, like the types of crops they mainly cultivated. In some regions, female farmers were found to be especially prominent in the cultivation of specific types of crops and even constituted the majority of farmers who cultivated those crops; for instance, \_\_\_\_\_

Which choice most effectively uses data from the graph to complete the example?

- A. most of the farmers who mainly cultivated cereals and most of the farmers who mainly cultivated non-root vegetables in south Ondo were women.
- B. more women in central Ondo mainly cultivated root crops than mainly cultivated cereals.
- C. most of the farmers who mainly cultivated non-root vegetables in north and south Ondo were women.
- D. a relatively equal proportion of women across the three regions of Ondo mainly cultivated cereals

Additional Notes

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## EXTRA PRACTICE

25

Estimates of Tyrannosaurid Bite Force

Study	Year	Estimation method	Approximate bite force (newtons)
Cost et al.	2019	muscular and skeletal modeling	35,000–63,000
Gignac and Erickson	2017	tooth-bone interaction analysis	8,000–34,000
Meers	2002	body-mass scaling	183,000–235,000
Bates and Falkingham	2012	muscular and skeletal modeling	35,000–57,000

The largest tyrannosaurids—the family of carnivorous dinosaurs that includes *Tarbosaurus*, *Albertosaurus*, and, most famously, *Tyrannosaurus rex*—are thought to have had the strongest bites of any land animals in Earth’s history. Determining the bite force of extinct animals can be difficult, however, and paleontologists Paul Barrett and Emily Rayfield have suggested that an estimate of dinosaur bite force may be significantly influenced by the methodology used in generating that estimate.

Which choice best describes data from the table that support Barrett and Rayfield’s suggestion?

- A. The study by Meers used body-mass scaling and produced the lowest estimated maximum bite force, while the study by Cost et al. used muscular and skeletal modeling and produced the highest estimated maximum.
- B. In their study, Gignac and Erickson used tooth-bone interaction analysis to produce an estimated bite force range with a minimum of 8,000 newtons and a maximum of 34,000 newtons.
- C. The bite force estimates produced by Bates and Falkingham and by Cost et al. were similar to each other, while the estimates produced by Meers and by Gignac and Erickson each differed substantially from any other estimate.
- D. The estimated maximum bite force produced by Cost et al. exceeded the estimated maximum produced by Bates and Falkingham, even though both groups of researchers used the same method to generate their estimates.

Additional Notes

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## EXTRA PRACTICE

26

### Average Number and Duration of Torpor Bouts and Arousal Episodes for Alaska Marmots and Arctic Ground Squirrels, 2008–2011

Feature	Alaska marmots	Arctic ground squirrels
torpor bouts	12	10.5
duration per bout	13.81 days	16.77 days
arousal episodes	11	9.5
duration per episode	21.2 hours	14.2 hours

When hibernating, Alaska marmots and Arctic ground squirrels enter a state called torpor, which minimizes the energy their bodies need to function. Often a hibernating animal will temporarily come out of torpor (called an arousal episode) and its metabolic rate will rise, burning more of the precious energy the animal needs to survive the winter. Alaska marmots hibernate in groups and therefore burn less energy keeping warm during these episodes than they would if they were alone. A researcher hypothesized that because Arctic ground squirrels hibernate alone, they would likely exhibit longer bouts of torpor and shorter arousal episodes than Alaska marmots.

Which choice best describes data from the table that support the researcher's hypothesis?

- A. The Alaska marmots' arousal episodes lasted for days, while the Arctic ground squirrels' arousal episodes lasted less than a day.
- B. The Alaska marmots and the Arctic ground squirrels both maintained torpor for several consecutive days per bout, on average.
- C. The Alaska marmots had shorter torpor bouts and longer arousal episodes than the Arctic ground squirrels did.
- D. The Alaska marmots had more torpor bouts than arousal episodes, but their arousal episodes were much shorter than their torpor bouts.

Additional Notes

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## EXTRA PRACTICE

27

### Number and Origin of Clamshell Tools Found at Different Levels Below the Surface in Neanderthal Cave

Depth of tools found below surface in cave (meters)	Clamshells that Neanderthals collected from the beach	Clamshells that Neanderthals harvested from the seafloor
3–4	99	33
6–7	1	0
4–5	2	0
2–3	7	0
5–6	18	7

Studying tools unearthed at a cave site on the western coast of Italy, archaeologist Paola Villa and colleagues have determined that prehistoric Neanderthal groups fashioned them from shells of clams that they harvested from the seafloor while wading or diving or that washed up on the beach. Clamshells become thin and eroded as they wash up on the beach, while those on the seafloor are smooth and sturdy, so the research team suspects that Neanderthals prized the tools made with seafloor shells. However, the team also concluded that those tools were likely more challenging to obtain, noting that \_\_\_\_\_

Which choice most effectively uses data from the table to support the research team's conclusion?

- A. at each depth below the surface in the cave, the difference in the numbers of tools of each type suggests that shells were easier to collect from the beach than to harvest from the seafloor.
- B. the highest number of tools were at a depth of 3–4 meters below the surface, which suggests that the Neanderthal population at the site was highest during the related period of time.
- C. at each depth below the surface in the cave, the difference in the numbers of tools of each type suggests that Neanderthals preferred to use clamshells from the beach because of their durability.
- D. the higher number of tools at depths of 5–6 meters below the surface in the cave than at depths of 4–5 meters below the surface suggests that the size of clam populations changed over time.

Additional Notes

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