Americans and Digital Knowledge

A majority of U.S. adults can answer fewer than half the questions correctly on a digital knowledge quiz, and many struggle with certain cybersecurity and privacy questions

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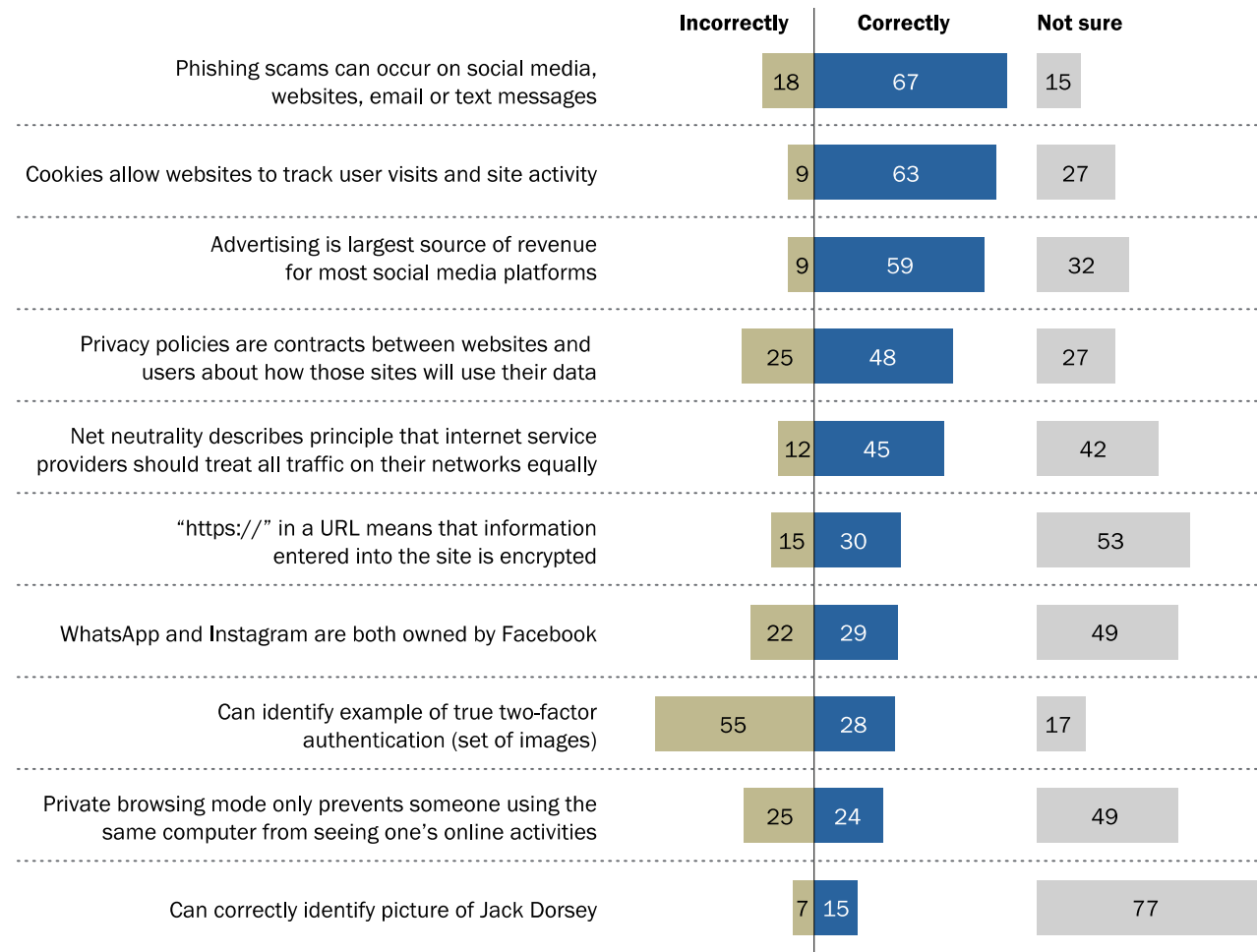
A new Pew Research Center survey finds that Americans' understanding of technology-related issues varies greatly depending on the topic, term or concept. While a majority of U.S. adults can correctly answer questions about phishing scams or website cookies, other items are more challenging. For example, just 28% of adults can identify an example of two-factor authentication – one of the most important ways experts say people can protect their personal information on sensitive accounts. Additionally, about one-quarter of Americans (24%) know that private browsing only hides browser history from other users of that computer, while roughly half (49%) say they are unsure what private browsing does.

This survey consisted of 10 questions designed to test Americans' knowledge of a range of digital topics, such as cybersecurity or the business side of social media companies. The median number of correct answers was four. Only 20% of adults answered seven or more questions correctly, and just 2% got all 10 questions correct.

As was true in a previous Center survey, Americans' knowledge of digital topics varies substantially by educational attainment as well as by age. Adults with a bachelor's or advanced degree and those under the age of 50 tend to score higher on these questions. These are some of the key findings from a Pew Research Center survey of 4,272 adults living in the United States conducted June 3-17, 2019.

Many Americans are unsure about a number of digital topics

% of U.S. adults answering each question ...

	Incorrectly	Correctly	Not sure
Phishing scams can occur on social media, websites, email or text messages	18	67	15
Cookies allow websites to track user visits and site activity	9	63	27
Advertising is largest source of revenue for most social media platforms	9	59	32
Privacy policies are contracts between websites and users about how those sites will use their data	25	48	27
Net neutrality describes principle that internet service providers should treat all traffic on their networks equally	12	45	42
"https://" in a URL means that information entered into the site is encrypted	15	30	53
WhatsApp and Instagram are both owned by Facebook	22	29	49
Can identify example of true two-factor authentication (set of images)	55	28	17
Private browsing mode only prevents someone using the same computer from seeing one's online activities	25	24	49
Can correctly identify picture of Jack Dorsey	7	15	77

Note: Those who did not give an answer are not shown. All questions are multiple choice; for full question wording, see topline.
Source: Survey conducted June 3-17, 2019.
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Americans are more knowledgeable about certain digitally focused topics than others

Americans' understanding of these topics varies drastically across the 10 questions presented in the Center's survey. To begin with, only three questions were answered correctly by a majority of adults. About two-thirds of U.S. adults (67%) know that phishing scams can occur across multiple platforms, including email, text messages, social media or websites. Some 63% of Americans understand that cookies are text files that allow websites to track users' site visits and activities.

Similarly, 59% know that advertising is the largest source of revenue for most social media sites, rather than things such as exclusive licensing deals (4%) or corporate consulting (2%).

Additionally, 48% of adults correctly answered that a privacy policy is a contract between websites and users regarding how their data will be used, while 45% know that net neutrality refers to the principle that internet service providers should treat all traffic on their networks equally.

Other concepts in the survey are far less familiar to the public. Only three-in-ten adults correctly answered that starting a URL with "https://" means that the information entered on that site is encrypted (30%). A similar share (28%) accurately identified an example of two-factor authentication. (This involves confirming individuals are who they claim to be in at least two of the following ways: inputting information only the user knows, like a password; using an outside source they possess, like a phone number or token key; or through something like a fingerprint.) A somewhat smaller share – 24% of Americans – is aware that "private browsing" or "incognito mode" only hides online activity from other individuals using the same computer. (It does not mean that the user's activities are masked and not being captured by the websites, the internet provider, or an employer if the browsing is being done on a work computer.)

Americans' knowledge of the business side of social media companies is also relatively low. Just 29% of Americans correctly named WhatsApp and Instagram as two companies owned by Facebook. And when presented with a photo of Twitter co-founder and CEO Jack Dorsey, only 15% of adults correctly identified him.

It is important to note that while the share of adults who can correctly answer questions about these issues varies across topics, Americans are more likely to express uncertainty about the topic than give inaccurate answers in most cases. Indeed, the two-factor authentication question is the only question answered incorrectly by more than half of respondents.

Nearly one-in-five adults (17%) say they are not sure how to identify an example of two-factor authentication, and 15% say they do not know where phishing scams occur. These shares, however, are relatively small when compared with a number of other questions in this survey where "not sure" responses are far more common than incorrect answers. For example, 49% of adults each indicate they are unsure which two companies from a list of options are owned by Facebook as well as say they do not understand what private browsing entails. Still, the largest share of "unsure" responses comes on the question in which respondents are presented with a photo of Jack Dorsey: 77% report being unsure of whom the photo depicts.
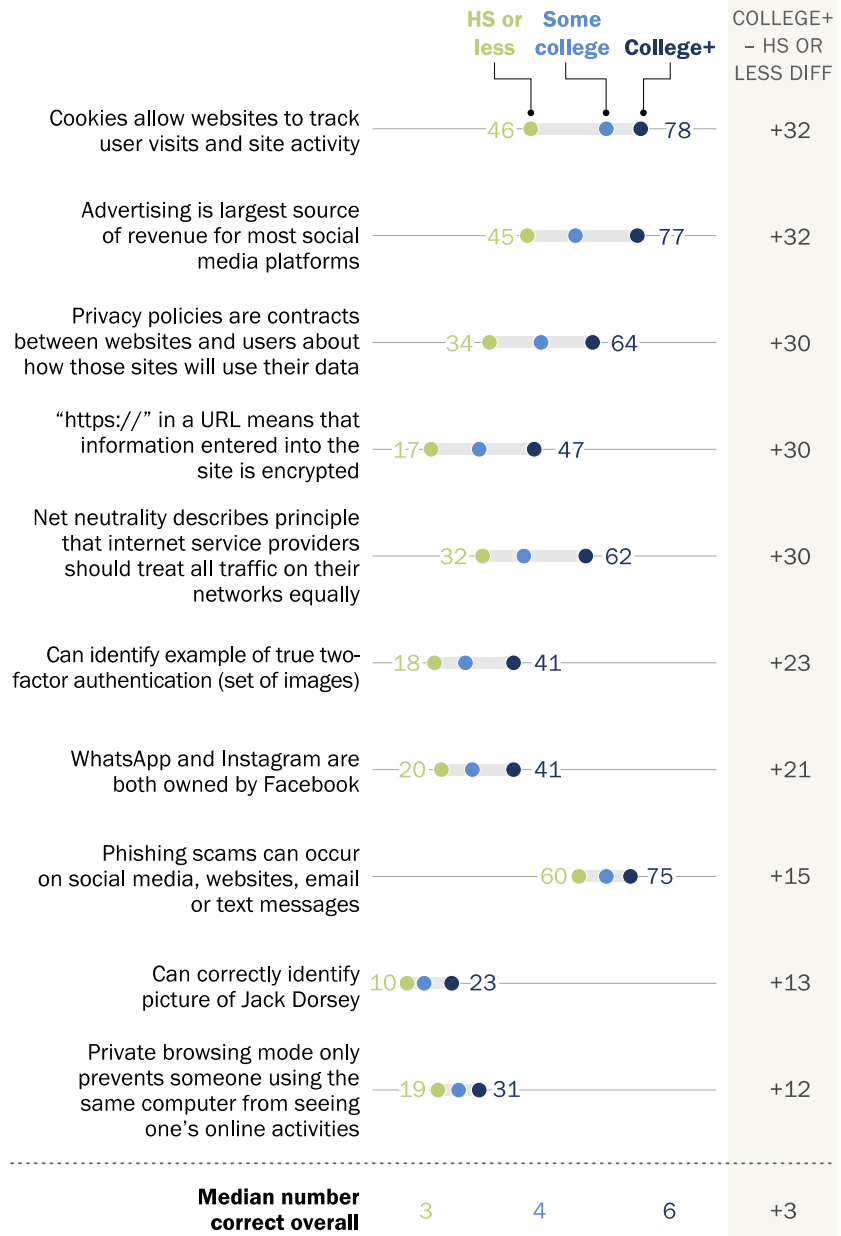
Americans with higher levels of educational attainment are more likely to answer digital knowledge questions correctly

The public's knowledge of digital topics varies substantially by educational attainment. Adults with a bachelor's or advanced degree answered a median of six questions correctly, compared with four correct answers by those who have attended college but have not obtained a degree and three by those with a high school diploma or less. Roughly four-in-ten adults with at least a bachelor's degree accurately answered seven or more questions (37%), compared with 20% of those with some college experience and just 9% of those with a high school education or less.

For all 10 questions, there are double-digit gaps between those who have a bachelor's or advanced degree and those who have a high school education or less. And on five questions, the difference sits at roughly 30 percentage points. These include how cookies

Digital knowledge varies by educational attainment

% of U.S. adults answering each question correctly

Question	HS or less	Some college	College+	COLLEGE+ – HS OR LESS DIFF
Cookies allow websites to track user visits and site activity	46		78	+32
Advertising is largest source of revenue for most social media platforms	45		77	+32
Privacy policies are contracts between websites and users about how those sites will use their data	34		64	+30
"https://" in a URL means that information entered into the site is encrypted	17		47	+30
Net neutrality describes principle that internet service providers should treat all traffic on their networks equally	32		62	+30
Can identify example of true two-factor authentication (set of images)	18		41	+23
WhatsApp and Instagram are both owned by Facebook	20		41	+21
Phishing scams can occur on social media, websites, email or text messages	60		75	+15
Can correctly identify picture of Jack Dorsey	10		23	+13
Private browsing mode only prevents someone using the same computer from seeing one's online activities	19		31	+12
Median number correct overall	3	4	6	+3

Note: All questions are multiple choice; for full question wording, see topline. "College+" includes those who have a bachelor's or advanced degree. "Some college" includes those who have an associate degree and who have attended college but have not obtained a degree. "High school or less" refers to those who have a high school diploma or its equivalent and those who did not complete high school.
Source: Survey conducted June 3-17, 2019.
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work (where there is a gap of 32 percentage points between those with at least a bachelor's degree and those with a high school education or less); what the largest source of revenue for social media sites is (32-point gap); what a privacy policy is (30-point gap); what "https://" means in a URL (30-point gap); and what net neutrality is (30-point gap).

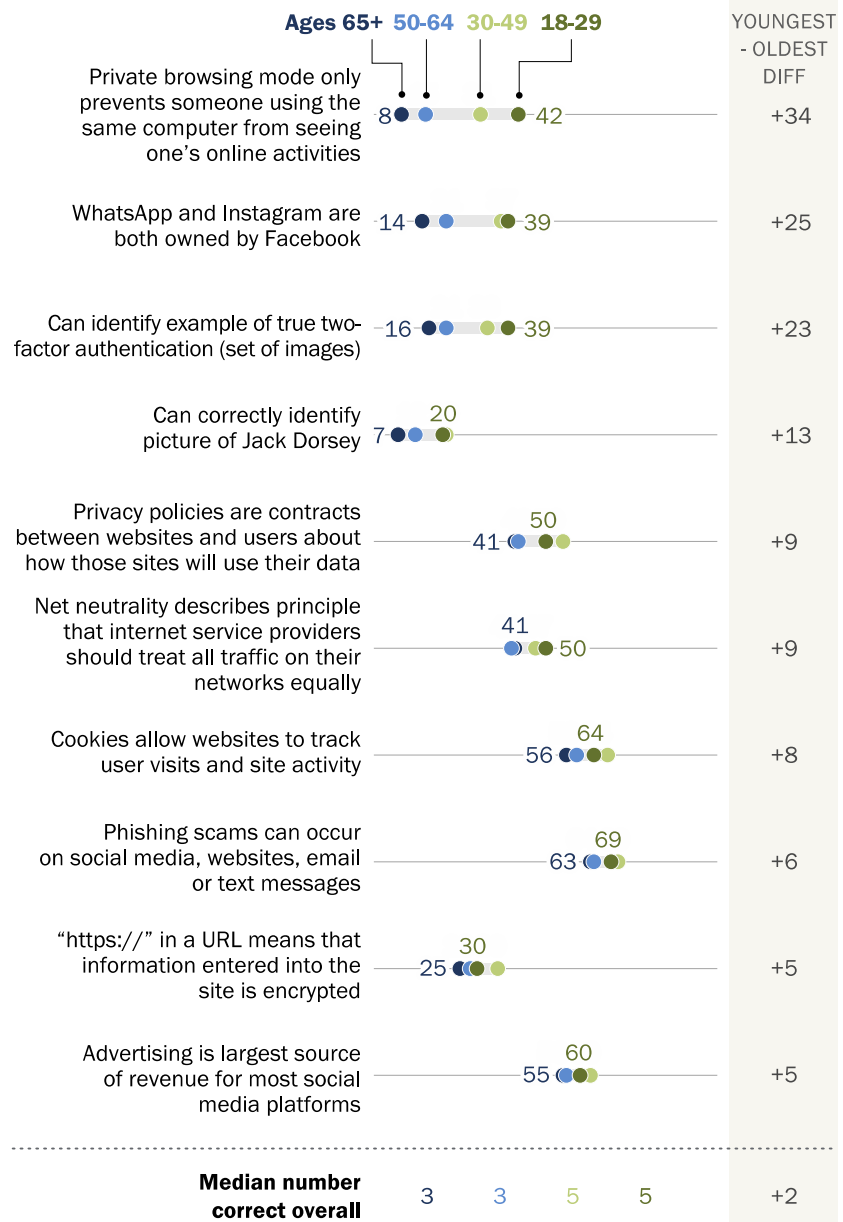## Younger adults generally score higher than older adults across digital knowledge questions

Beyond educational differences, digital knowledge also varies by age, though these gaps are less pronounced than those tied to education levels.

For example, 18- to 29-year-olds correctly answered a median of five out of 10 questions, compared with a median of three among those ages 65 and older.

The degree of these differences varies across the full set of questions. There are sizable gaps between the youngest and oldest age groups on knowing how private browsing functions

Younger adults tend to have higher levels of digital knowledge, but these differences vary by question

% of U.S. adults answering each question correctly

	Ages 65+ · 50-64 · 30-49 · 18-29	YOUNGEST - OLDEST DIFF
Private browsing mode only prevents someone using the same computer from seeing one's online activities	8 — 42	+34
WhatsApp and Instagram are both owned by Facebook	14 — 39	+25
Can identify example of true two-factor authentication (set of images)	16 — 39	+23
Can correctly identify picture of Jack Dorsey	7 — 20	+13
Privacy policies are contracts between websites and users about how those sites will use their data	41 — 50	+9
Net neutrality describes principle that internet service providers should treat all traffic on their networks equally	41 — 50	+9
Cookies allow websites to track user visits and site activity	56 — 64	+8
Phishing scams can occur on social media, websites, email or text messages	63 — 69	+6
"https://" in a URL means that information entered into the site is encrypted	25 — 30	+5
Advertising is largest source of revenue for most social media platforms	55 — 60	+5
Median number correct overall	3 3 5 5	+2

Note: All questions are multiple choice; for full question wording, see topline.
Source: Survey conducted June 3-17, 2019.
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(a 34-point difference); knowing that Facebook owns Instagram and WhatsApp (25 points) or being able to identify an example of two-factor authentication (23 points). But there are other questions with gaps that are far less pronounced – like identifying what "https://" means in a URL or knowing that advertising is the primary way social media companies generate revenue.

Acknowledgments

Methodology

The American Trends Panel survey methodology

The American Trends Panel (ATP), created by Pew Research Center, is a nationally representative panel of randomly selected U.S. adults. Panelists participate via self-administered web surveys. Panelists who do not have internet access at home are provided with a tablet and wireless internet connection. The panel is being managed by Ipsos.

Data in this report are drawn from the panel wave conducted June 3 to June 17, 2019. A total of 4,272 panelists responded out of 5,869 who were sampled, for a response rate of 73%. This does not include six panelists who were removed from the data due to extremely high rates of refusal or straightlining. The cumulative response rate accounting for nonresponse to the recruitment surveys and attrition is 5.1%. The break-off rate among panelists who logged onto the survey and completed at least one item is 1.7%. The margin of sampling error for the full sample of 4,272 respondents is plus or minus 1.9 percentage points.

American Trends Panel recruitment surveys

Recruitment dates	Mode	Invited	Joined	Active panelists remaining
Jan. 23 to March 16, 2014	Landline/ cell RDD	9,809	5,338	2,503
Aug. 27 to Oct. 4, 2015	Landline/ cell RDD	6,004	2,976	1,464
April 25 to June 4, 2017	Landline/ cell RDD	3,905	1,628	801
Aug. 8 to Oct. 31, 2018	ABS/web	9,396	8,778	8,691
Total		**29,114**	**18,720**	**13,459**

Note: Approximately once per year, panelists who have not participated in multiple consecutive waves or who did not complete an annual profiling survey are removed from the panel. Panelists also become inactive if they ask to be removed from the panel.

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The subsample from the ATP was selected by grouping panelists into five strata so demographic groups that are underrepresented in the panel had a higher probability of selection than overrepresented groups:

- Stratum A consists of panelists who are non-internet users. They were sampled at a rate of 100%.
- Stratum B consists of panelists with a high school education or less. They were sampled at a rate of 98.9%.
- Stratum C consists of panelists that are Hispanic, unregistered to vote, or non-volunteers. They were sampled at a rate of 44.8%.

- Stratum D consists of panelists that are black or 18-34 years old. They were sampled at a rate of 18.2%.
- Stratum E consists of the remaining panelists. They were sampled at a rate of 13.5%.

The ATP was created in 2014, with the first cohort of panelists invited to join the panel at the end of a large, national, landline and cellphone random-digit-dial survey that was conducted in both English and Spanish. Two additional recruitments were conducted using the same method in 2015 and 2017, respectively. Across these three surveys, a total of 19,718 adults were invited to join the ATP, of which 9,942 agreed to participate.

In August 2018, the ATP switched from telephone to address-based recruitment. Invitations were sent to a random, address-based sample (ABS) of households selected from the U.S. Postal Service's Delivery Sequence File. In each household, the adult with the next birthday was asked to go online to complete a survey, at the end of which they were invited to join the panel. For a random half-sample of invitations, households without internet access were instructed to return a postcard. These households were contacted by telephone and sent a tablet if they agreed to participate. A total of 9,396 were invited to join the panel, and 8,778 agreed to join the panel and completed an initial profile survey. Of the 18,720 individuals who have ever joined the ATP, 13,459 remained active panelists and continued to receive survey invitations at the time this survey was conducted.

The U.S. Postal Service's Delivery Sequence File has been estimated to cover as much as 98% of the population, although some studies suggest that the coverage could be in the low 90% range.[1]

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[1] AAPOR Task Force on Address-based Sampling. 2016. "AAPOR Report: Address-based Sampling."

Weighting dimensions

Variable	Benchmark source
Gender	2017 American Community Survey
Age	
Education	
Race/Hispanic origin	
Hispanic nativity Home internet access	
Region x Metropolitan status	2018 CPS March Supplement
Volunteerism	2017 CPS Volunteering and Civic Life Supplement
Voter registration	2016 CPS Voting and Registration Supplement
Party affiliation	Average of the three most recent Pew Research Center telephone surveys.

Note: Estimates from the ACS are based on non-institutionalized adults. Voter registration is calculated using procedures from Hur, Achen (2013) and rescaled to include the total U.S. adult population.

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Weighting

The ATP data were weighted in a multistep process that begins with a base weight incorporating the respondents' original survey selection probability and the fact that in 2014 and 2017 some respondents were subsampled for invitation to the panel. The next step in the weighting uses an iterative technique that aligns the sample to population benchmarks on the dimensions listed in the accompanying table.

Sampling errors and testing of statistical significance take into account the effect of weighting. Interviews are conducted in both English and Spanish, but the American Trends Panel's Hispanic sample is predominantly U.S. born and English speaking.

In addition to sampling error, one should bear in mind that question wording and practical difficulties in conducting surveys can introduce error or bias into the findings of opinion polls.

The following table shows the unweighted sample sizes and the error attributable to sampling that would be expected at the 95% level of confidence for different groups in the survey:

Group	Unweighted sample size	Plus or minus ...
Total sample	4,272	1.9 percentage points
HS or less	1,483	3.3 percentage points
Some college	1,182	3.4 percentage points
College+	1,600	2.9 percentage points
Ages 18-29	671	4.8 percentage points
30-49	1,314	3.3 percentage points
50-64	1,308	3.4 percentage points
65+	977	3.8 percentage points

Sample sizes and sampling errors for other subgroups are available upon request.

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Topline questionnaire

**2019 PEW RESEARCH CENTER'S AMERICAN TRENDS PANEL
WAVE 49 JUNE 2019
FINAL TOPLINE
JUNE 3-17, 2019
TOTAL N=4,272**

THE QUESTIONS PRESENTED BELOW ARE PART OF A LARGER SURVEY CONDUCTED ON THE AMERICAN TRENDS PANEL. OTHER QUESTIONS ON THIS SURVEY HAVE EITHER BEEN PREVIOUSLY RELEASED OR HELD FOR FUTURE RELEASE.

[RANDOMIZE ORDER OF QUESTIONS KNOW1-KNOW10]
Here's a different kind of question. (If you don't know the answer, select "Not sure.") As far as you know…

ASK ALL:
KNOW1   If a website uses cookies, it means that the site… **[RANDOMIZE OPTIONS 1-4]**

June 3-17, 2019	
5	Can see the content of all the files on the device you are using
2	Is not a risk to infect your device with a computer virus
2	Will automatically prompt you to update your web browser software if it is out of date
63	Can track your visits and activity on the site {correct}
27	Not sure
1	No answer

ASK ALL:
KNOW2   Which of the following is the largest source of revenue for most major social media platforms? … **[RANDOMIZE OPTIONS 1-4]**

June 3-17, 2019	
4	Exclusive licensing deals with internet service providers and cellphone manufacturers
59	Allowing companies to purchase advertisements on their platforms {correct}
2	Hosting conferences for social media influencers
2	Providing consulting services to corporate clients
32	Not sure
1	No answer

ASK ALL:
KNOW3   When a website has a privacy policy, it means that the site… **[RANDOMIZE OPTIONS 1-4]**

June 3-17, 2019	
48	Has created a contract between itself and its users about how it will use their data {correct}
17	Will not share its users' personal information with third parties
4	Adheres to federal guidelines about deceptive advertising practices
3	Does not retain any personally identifying information about its users

27	Not sure
1	No answer

ASK ALL:
KNOW4
What does it mean when a website has "https://" at the beginning of its URL, as opposed to "http://" without the "s"? **[RANDOMIZE OPTIONS 1-4]**

June 3-17,
2019

30	Information entered into the site is encrypted {correct}
1	The content on the site is safe for children
2	The site is only accessible to people in certain countries
12	The site has been verified as trustworthy
53	Not sure
1	No answer

ASK ALL:
KNOW5
Where might someone encounter a phishing scam? **[RANDOMIZE OPTIONS 1-4]**

June 3-17,
2019

12	In an email
2	On social media
1	In a text message
2	On a website
67	All of the above {correct}
*	None of the above
15	Not sure
*	No answer

ASK ALL:
KNOW6
Which two companies listed below are both owned by Facebook? **[RANDOMIZE OPTIONS 1-4]**

June 3-17,
2019

11	Twitter and Instagram
8	Snapchat and WhatsApp
29	WhatsApp and Instagram {correct}
3	Twitter and Snapchat
49	Not sure
*	No answer

ASK ALL:
KNOW7
The term "net neutrality" describes the principle that… **[RANDOMIZE OPTIONS 1-4]**

June 3-17,
2019

45	Internet service providers should treat all traffic on their networks equally {correct}
6	Social media platforms must give equal visibility to conservative and liberal points of view
2	Online advertisers cannot post ads for housing or jobs that are only

	visible to people of a certain race
4	The government cannot censor online speech
42	Not sure
1	No answer

ASK ALL:

KNOW8
Many web browsers offer a feature known as "private browsing" or "incognito mode." If someone opens a webpage on their computer at work using incognito mode, which of the following groups will NOT be able to see their online activities? **[RANDOMIZE OPTIONS 1-4]**

June 3-17,
2019

4	The group that runs their company's internal computer network
3	Their company's internet service provider
24	A coworker who uses the same computer {correct}
18	The websites they visit while in private browsing mode
49	Not sure
1	No answer

ASK ALL:

KNOW9
Some websites and online services use a security process known as two-step or two-factor authentication. Which of the following images is an example of two-factor authentication? **[RANDOMIZE OPTIONS 1-4]**
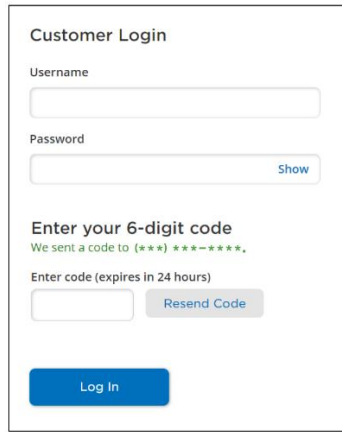
June 3-17,
2019

| 28 | {correct} |

| 3 | |

4

5

42	All of the above
17	Not sure
*	No answer

ASK ALL:
KNOW10   Who is this technology leader? **[RANDOMIZE OPTIONS 1-4]**

June 3-17, 2019	
15	Jack Dorsey, co-founder of Twitter {correct}
3	Sergey Brin, co-founder of Google
2	Elon Musk, co-founder of Tesla
3	Travis Kalanick, co-founder of Uber
77	Not sure
*	No answer