YALE PROJECT ON
CLIMATE CHANGE
COMMUNICATION
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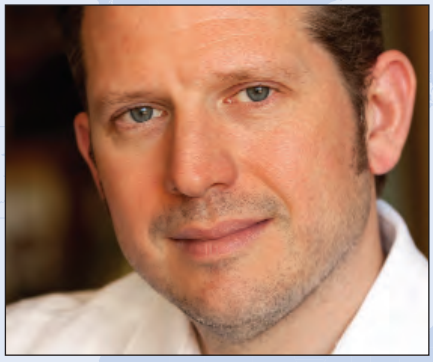
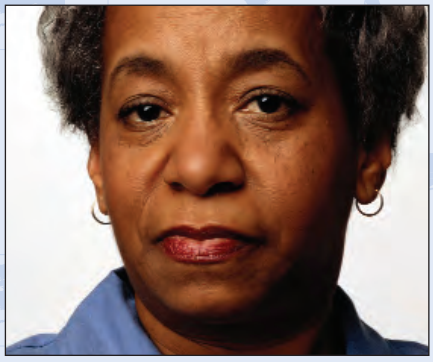
Knowledge of Climate Change Across Global Warming's Six Americas



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Interview dates: June 25, 2010 – July 22, 2010
Interviews: 2,030 Adults (18+)
Margin of error: +/- 2 percentage points at the 95% confidence level.
NOTE: All results show percentages among all respondents, unless otherwise labeled. Totals may occasionally sum to more than 100 percent due to rounding. Best or correct answers are indicated with a (√). Unknown or uncertain answers are indicated with a (*). See the Appendix: Answer Key for citations.

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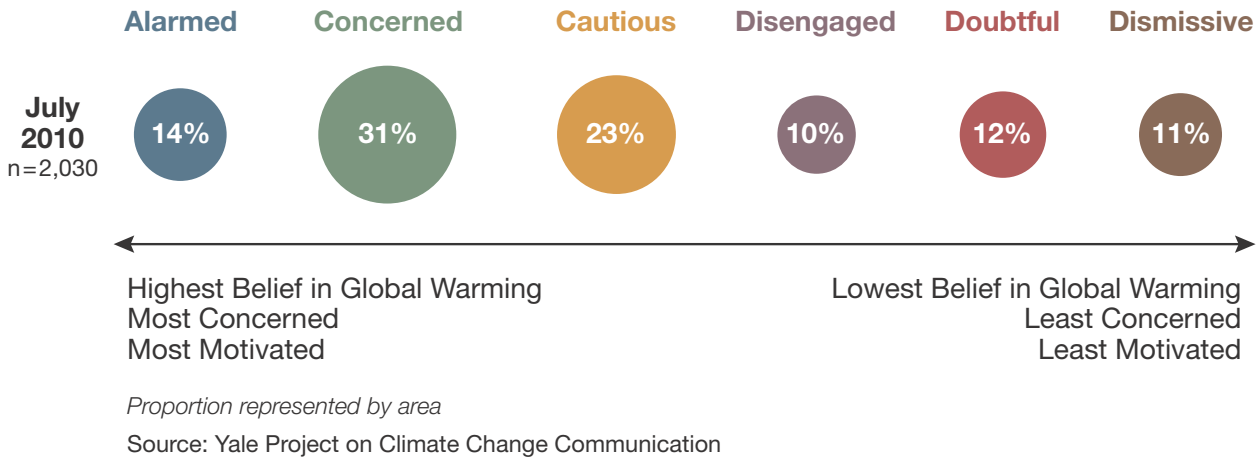
Executive Summary

Knowledge of Climate Change Across Global Warming's Six Americas reports results from a national study of what the American public understands about how the climate system works, and the causes, impacts and potential solutions to global warming. Prior research has identified six distinct audiences within the American public (the Alarmed, Concerned, Cautious, Disengaged, Doubtful, and Dismissive) that each respond to global warming in very different ways (see figure below). For an introduction to these different "Americas" please see the report Global Warming's Six Americas (2009) available at www.environment.yale.edu/climate/



This report describes how knowledge of climate change varies across these different groups. Using a straight grading scale, 49 percent of the Alarmed received a passing grade (A, B, or C), compared to 33 percent of the Concerned, 16 percent of the Cautious, 17 percent of the Doubtful, 4 percent of the Dismissive, and 5 percent of the Disengaged. While knowledge levels vary significantly across the groups, these results also indicate that relatively few Americans have an in-depth understanding of climate change.

Understanding of Climate Change

In general, the Alarmed and the Concerned better understand how the climate system works and the causes, consequences, and solutions of climate change than the Disengaged, the Doubtful and the Dismissive. For example:

- 98% of the Alarmed and 91% of the Concerned say that global warming is happening, compared to 12% of the Dismissive;
- 87% of the Alarmed and 76% of the Concerned understand that global warming is caused mostly by human activities compared to 37% of the Disengaged, 6% of the Doubtful and 3% of the Dismissive;
- 79% of the Alarmed and 54% of the Concerned understand that most scientists think global warming is happening, compared to 31% of the Cautious, 15% of the Disengaged, 16% of the Doubtful, and 7% of the Dismissive;
- 86% of the Alarmed and 71% of the Concerned understand that emissions from cars and trucks substantially contribute to global warming compared to 18% of the Disengaged, 16% of the Doubtful and 10% of the Dismissive;

- 89% of the Alarmed and 64% of the Concerned understand that a transition to renewable energy sources is an important solution compared to 12% of the Disengaged, 13% of the Doubtful and 7% of the Dismissive.

However, this study also found that for some knowledge questions the Doubtful and Dismissive have as good an understanding, and sometimes better, than the Alarmed and the Concerned. For example:

- 79% of the Dismissive and 74% of the Doubtful correctly understand that the greenhouse effect refers to gases in the atmosphere that trap heat, compared to 66% of the Alarmed and 64% of the Concerned;
- The Dismissive are significantly less likely to incorrectly say that "the greenhouse effect" refers to the Earth's protective ozone layer than all other groups, including the Alarmed (13% vs. 24% respectively);
- 50% of the Dismissive and 57% of the Doubtful understand that carbon dioxide traps heat from the Earth's surface, compared to 59% of the Alarmed, and 45% of the Concerned.

Knowledge Gaps

This study also identified numerous gaps between expert and public knowledge about climate change across the Six Americas. For example, only:

- 13% of the Alarmed know how much carbon dioxide there is in the atmosphere today (approximately 390 parts per million) compared to 5% of the Concerned, 9% of the Cautious, 4% of the Disengaged, 6% of the Doubtful and 7% of the Dismissive;
- 52% of the Alarmed have heard of coral bleaching, vs. 24% of the Concerned, 23% of the Cautious, 5% of the Disengaged, 21% of the Doubtful and 24% of the Dismissive;
- 46% of the Alarmed have heard of ocean acidification, vs. 22% of the Concerned, 25% of the Cautious, 6% of the Disengaged, 23% of the Doubtful and 16% of the Dismissive.

Common Misconceptions

This study also found important misconceptions leading many to misunderstand the causes and therefore the solutions to climate change. For example, many Americans confuse climate change and the hole in the ozone layer. Such misconceptions were particularly apparent for the Alarmed and Concerned segments:

- 63% of the Alarmed and 49% of the Concerned believe that the hole in the ozone layer is a significant contributor to global warming compared to 32% of the Cautious, 12% of the Disengaged, 6% of the Doubtful and 7% of the Dismissive;
- 49% of the Alarmed and 36% of the Concerned believe that aerosol spray cans are a significant contributor to global warming compared to 20% of the Cautious, 9% of the Disengaged, 7% of the Doubtful and 5% of the Dismissive;
- 39% of the Alarmed and 23% of the Concerned believe that banning aerosol spray cans would reduce global warming compared to 13% of the Cautious, 3% of the Disengaged, 4% of the Doubtful and 1% of the Dismissive.

Despite the recent controversies over "climategate" and the 2007 IPCC report, this study found that the Alarmed and the Concerned trust scientists and scientific organizations more than any other source of information about global warming, whereas the Doubtful and the Dismissive are most likely to trust their own family and friends.

Concerned, Cautious and Disengaged Americans also recognize their own limited understanding of the issue. Fewer than 1 in 10 say they are "very well informed" about climate change, and 75 percent or more say they would like to know more. The Alarmed and the Dismissive feel somewhat more informed about climate change with 28% and 23% respectively saying they are "very well informed". However, only 28% of the Dismissive say they would like to learn more about climate change, compared to 76% of the Alarmed.

Introduction

Knowledge about climate change can be divided into several general and overlapping categories: knowledge about how the climate system works; specific knowledge about the causes, consequences, and potential solutions to global warming; contextual knowledge placing human-caused global warming in historical and geographic perspective; and practical knowledge that enables individual and collective action. This study included measures related to each of these key dimensions, along with other measures such as public desire for more information, trust in different information sources, and climate change risk perceptions, policy preferences, and behaviors.

Methodology

These results come from a nationally representative survey of American adults, aged 18 and older. The sample was weighted to correspond with US Census Bureau demographic and Gallup political party identification parameters for the United States. The surveys were conducted by Knowledge Networks, using an online research panel of American adults. The survey was conducted June 24 through July 22, 2010 with 2,030 American adults. The margin of sampling error is plus or minus 2 percent, with 95 percent confidence. Question order and wording can also introduce error into the results of surveys.

For analysis, some items were re-coded as a 1 (a correct answer) or 0 (an incorrect answer, including don't know & refused). For example, several questions asked respondents whether a statement was "definitely true", "probably true", "probably false", or "definitely false". These responses were converted into a simple true vs. false dichotomous measure. Likewise, questions that provided the response options "a lot", "some", "a little", "not at all" or "don't know" were also converted into simple dichotomous variables for analysis.

In some cases, there is a clear "correct" or "incorrect" answer, strongly supported or strongly rejected by well-established scientific evidence. In other cases, there is a "best" answer reflecting broadly held scientific agreement, but somewhat more subjective. We provide references to peer-reviewed, scientific sources for each answer (see the Appendix: Answer Key). Best or correct answers are indicated with a (√). Unknown or uncertain answers are indicated with a (*). All results show percentages among all respondents, unless otherwise labeled. Totals may occasionally sum to more than 100 percent due to rounding. The term "order of items randomized" refers to a standard

survey technique in which questions and/or response categories are presented to respondents in a random order. This technique helps to prevent "order bias" in respondent answers.

The Six Americas were first identified in 2008, using a nationally representative survey of 2,164 American adults. Latent class analysis was used to segment respondents, based on 36 variables representing four distinct constructs: global warming beliefs, issue involvement, policy preferences, and behaviors. Discriminant functions derived from the latent class analysis were then used to replicate the earlier analysis. To develop a shorter and more easily used instrument capable of classifying members of new surveys into the six audience segments with 80% accuracy or better, we eliminated the 20 least predictive variables from the discriminant function. The resultant 16-item instrument correctly classified 83.8% of the 2008 sample (ranging from 60 to 99% in the six segments). This 16-item instrument was then implemented in this survey of Americans' knowledge of climate change and used to categorize the respondents into the six groups.

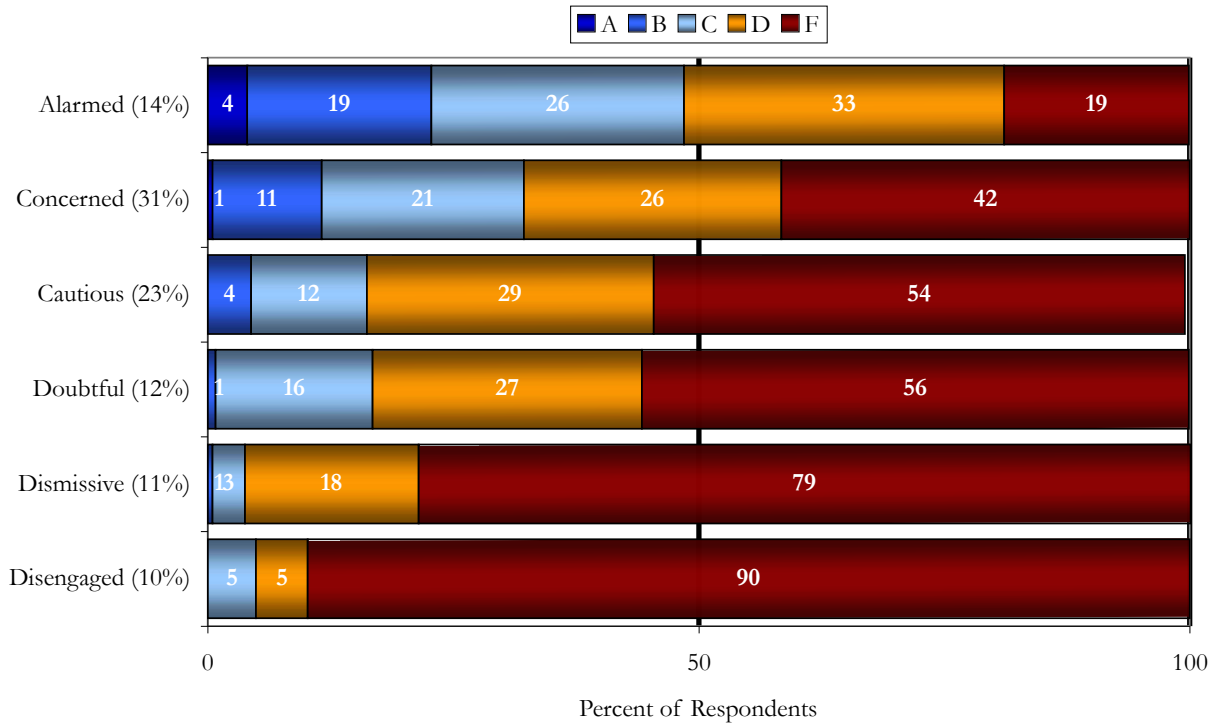
Grading the Public

As a first-brush estimate of overall public knowledge about climate change, a straight grading scale was constructed, using only those items for which there was a correct or best answer. To adjust for the difficulty of some items, only questions that were answered correctly by at least 25 percent of the respondents were included in the grade calculation (although all results are reported below in the results section). Thus this "grade" is based on a total of 81 individual questions. Each respondent was given a percentage score based on their total number of correct answers and graded on a straight scale (scores 90% and above = A, 80-89% = B, 70-79% = C, 60-69 = D, and scores 59% and below = F). On this scale, 49 percent of the Alarmed received a passing grade (A, B, or C), compared to 33 percent of the Concerned, 16 percent of the Cautious, 17 percent of the Doubtful, 4 percent of the Dismissive, and 5 percent of the Disengaged, indicating that relatively few Americans have an in-depth understanding of climate change.

This "grade", however, should be interpreted with caution. Some questions clearly were harder to answer than others. Likewise, other researchers might have chosen to assess different types of climate-related knowledge, which perhaps the public better understands. It is also important to recognize that very few Americans have ever taken a formal course on climate change, so it is perhaps unsurprising that they lack detailed knowledge about the issue. Instead, these results likely reflect the unorganized and sometimes contradictory fragments of information Americans have absorbed from the mass media and other sources. Further, many of these questions are outside the everyday practical needs of most people. Most people don't need to know about climate change in their daily life, thus it is not surprising that they have devoted little effort to learning these details.

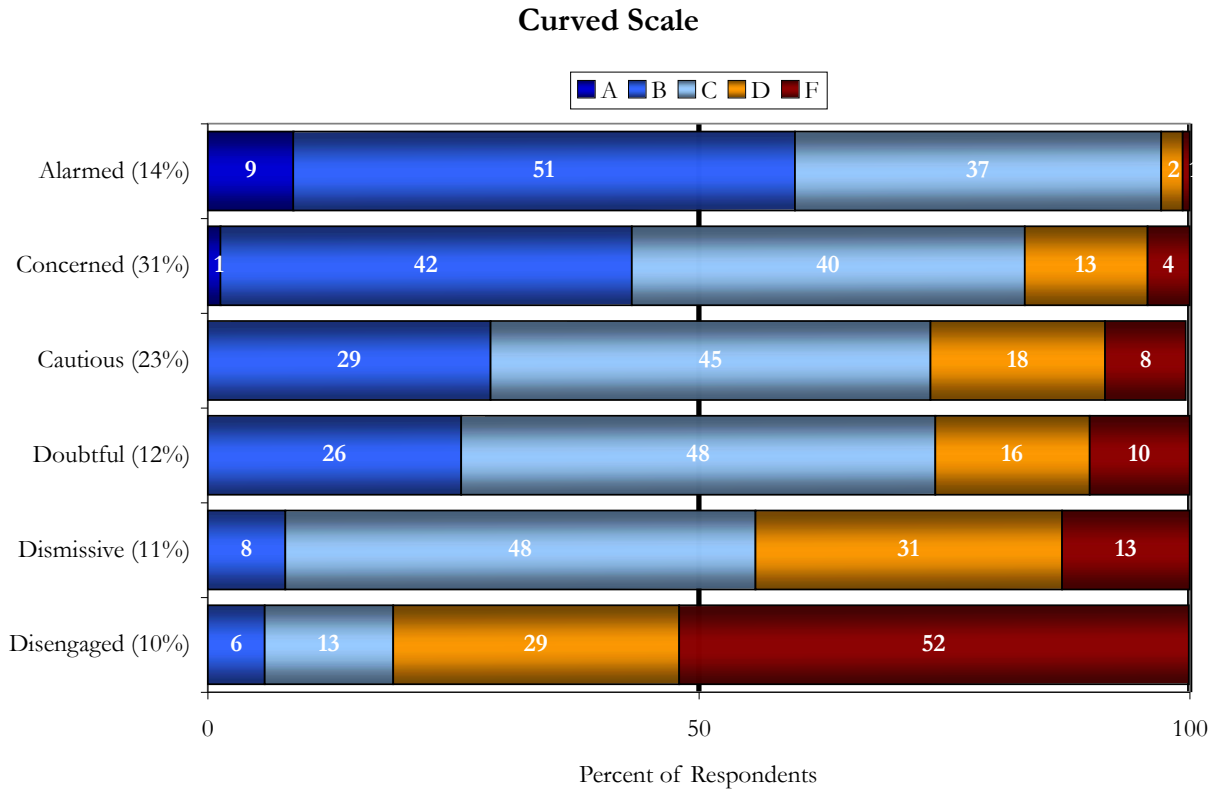
Nonetheless, many of these questions reveal important gaps in knowledge and common misconceptions about climate change and the earth system. These misconceptions lead some people to doubt that climate change is happening or that human activities are a major contributor, to misunderstand the causes and therefore the solutions, and to be unaware of the risks. Thus many Americans lack some of the knowledge needed for informed decision-making about this issue in a democratic society.

Straight Scale



To further adjust for the difficulty of some questions, we constructed a curved grading scale as an alternative scoring system. First, the mean percentage score was calculated (54%). Scores +/- 0.5 standard deviations from the mean (44% to 65%) were assigned the letter grade C. Scores ranging from +/- 0.5 to 1.5 standard deviations from the mean were assigned the letter grades B (66% to 86%) and D (23% to 43%) respectively. Finally, scores ranging from +/- 1.5 to 2.5 standard deviations from the mean were assigned the letter grades A (87% or higher) and F (22% or less) respectively.

On this curved grading system, 97 percent of the Alarmed receive a passing grade, compared to 83 percent of the Concerned, 74 percent of the Cautious, 74 percent of the Doubtful, 56 percent of the Dismissive, and 19 percent of the Disengaged. Note, however, that relatively few receive an A, even in this curved grading system.


Curved Scale
A
B
C
D
F
Alarmed (14%)
9
51
37
2
Concerned (31%)
1
42
40
13
4
Cautious (23%)
29
45
18
8
Doubtful (12%)
26
48
16
10
Dismissive (11%)
8
48
31
13
Disengaged (10%)
6
13
29
52
0
50
100
Percent of Respondents

Detailed Results

Q1. Recently, you may have noticed that global warming has been getting some attention in the news. Global warming refers to the idea that the world's average temperature has been increasing over the past 150 years, may be increasing more in the future, and that the world's climate may change as a result. What do you think? Do you think that global warming is happening?

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Yes (√)	**63**	98	91	58	36	28	12
No	**19**	1	0	13	12	52	75
Don't Know	**19**	1	9	30	52	20	14

People who answered yes to question 1 (i.e. those who believe global warming is happening) were asked the following question.

Q2. How sure are you that global warming is happening?

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Extremely sure	**21**	56	18	3	4	6	0
Very sure	**35**	33	42	25	41	15	48
Somewhat sure	**39**	10	38	63	43	71	28
Not at all sure	**4**	1	2	8	12	8	24
N	***1261***	*270*	*564*	*264*	*74*	*65*	*25*

People who answered no to question 1 (i.e. those who do not believe global warming is happening) were asked the following question.

Q3. How sure are you that global warming is not happening?

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Extremely sure	**18**	0	0	13	0	12	26
Very sure	**35**	100	33	4	0	42	45
Somewhat sure	**41**	0	33	66	92	42	25
Not at all sure	**6**	0	33	17	8	4	4
N	***366***	*2*	*3*	*53*	*26*	*123*	*161*

Q4. Assuming global warming is happening, do you think it is…

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Caused mostly by human activities (√)	**50**	87	76	43	37	6	3
Caused by both human activities and natural changes (vol.)	**6**	5	9	7	5	3	0
Caused mostly by natural changes in the environment	**35**	8	15	45	41	79	55
None of the above because global warming isn't happening	**7**	0	0	4	11	10	36
Other	**2**	1	1	1	2	2	6
Don't know (vol.)	**1**	0	0	0	4	0	1

Q5. Which comes closer to your own view?

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Most scientists think global warming is happening (√)	**39**	79	54	31	15	16	7
Most scientists think global warming is not happening	**6**	3	0	5	3	12	24
There is a lot of disagreement among scientists about whether or not global warming is happening	**38**	13	30	44	35	59	58
Don't know enough to say	**17**	5	15	20	47	13	12

Q6. How worried are you about global warming?

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Very worried	**16**	71	18	2	2	1	0
Somewhat worried	**39**	28	73	35	40	4	0
Not very worried	**26**	1	8	53	45	43	12
Not at all worried	**19**	0	1	10	13	52	88

Q7. Personally, how well informed do you feel you are about …

How the Earth's "climate system" works

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Very well informed	**11**	28	5	6	2	15	23
Fairly well informed	**51**	53	53	50	37	57	51
Not very well informed	**33**	18	40	37	52	22	17
Not at all informed	**5**	1	3	8	9	6	9

The different causes of global warming

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Very well informed	**13**	35	6	6	2	13	29
Fairly well informed	**52**	55	54	50	35	62	49
Not very well informed	**31**	10	38	39	51	21	11
Not at all informed	**5**	0	2	5	13	4	11

The different consequences of global warming

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Very well informed	**14**	39	8	5	2	17	27
Fairly well informed	**52**	49	58	55	33	57	47
Not very well informed	**29**	11	33	34	54	23	16
Not at all informed	**5**	1	1	6	12	4	9

Ways in which we can reduce global warming

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Very well informed	**14**	31	10	8	2	14	30
Fairly well informed	**50**	53	55	51	29	55	43
Not very well informed	**30**	15	32	34	52	26	18
Not at all informed	**6**	1	3	7	17	6	9

Q8. Have you ever heard of the "greenhouse effect"?

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Yes	**87**	96	90	82	71	89	93
No	**13**	4	10	18	29	11	7

People who answered yes to question 8 (i.e. those who had heard of the "greenhouse effect") were asked the following question.

Q9. The "greenhouse effect" refers to: *(items randomized)*

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Gases in the atmosphere that trap heat (√)	**66**	66	64	62	52	74	79
The Earth's protective ozone layer	**21**	24	21	25	20	20	13
Pollution that causes acid rain	**1**	1	2	1	1	1	1
How plants grow	**3**	6	3	3	1	1	0
Don't know	**10**	3	11	10	26	4	8
N	***1738***	*260*	*556*	*375*	*143*	*205*	*198*

Q10. How much can each of the following affect the average global temperature of the Earth? *(items randomized)*

Greenhouse gases in the atmosphere (√)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
A lot	**38**	84	55	25	9	11	12
Some	**30**	11	29	45	25	35	26
A little	**14**	2	5	14	15	36	30
Not at all	**2**	0	1	1	0	3	9
Don't know	**16**	3	10	14	51	14	23

Changes in the Earth's orbit around the sun (√)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
A lot	**32**	50	37	23	14	32	27
Some	**29**	31	26	34	22	28	26
A little	**13**	5	14	14	13	14	15
Not at all	**7**	6	6	9	1	8	10
Don't know	**20**	8	17	20	50	18	22

Volcanic eruptions (√)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
A lot	**28**	46	31	19	18	31	22
Some	**32**	30	36	44	16	23	27
A little	**17**	14	16	18	13	21	22
Not at all	**5**	3	4	3	3	10	12
Don't know	**17**	7	13	16	50	15	18

The amount of dust in the atmosphere (√)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
A lot	**21**	43	26	13	14	11	12
Some	**37**	26	42	46	22	38	27
A little	**17**	15	15	16	10	25	29
Not at all	**5**	3	4	6	1	7	9
Don't know	**21**	13	14	19	54	20	24

Sunspots (√)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
A lot	**17**	26	19	11	6	17	22
Some	**30**	33	32	33	19	31	26
A little	**16**	8	15	20	15	22	18
Not at all	**8**	10	7	8	2	7	11
Don't know	**29**	22	27	28	58	24	23

Clouds (√)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
A lot	**16**	25	18	11	12	17	9
Some	**32**	38	36	32	24	27	28
A little	**21**	19	19	26	9	27	22
Not at all	**11**	10	13	10	3	9	18
Don't know	**20**	8	14	21	53	20	23

Earthquakes

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
A lot	**15**	31	17	10	12	6	6
Some	**18**	20	22	20	13	13	9
A little	**20**	13	18	24	16	24	21
Not at all	**22**	22	18	20	8	34	35
Don't know	**26**	14	24	26	51	24	28

Whether the Earth's surface is light or dark colored (√)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
A lot	**13**	26	14	7	11	12	7
Some	**24**	26	27	27	16	23	12
A little	**19**	11	20	19	13	25	28
Not at all	**12**	13	8	13	4	14	23
Don't know	**33**	24	31	34	56	25	29

The phases of the moon

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
A lot	**8**	20	7	4	6	6	4
Some	**18**	18	19	23	12	12	14
A little	**18**	10	18	25	12	17	20
Not at all	**27**	34	29	23	8	40	29
Don't know	**30**	19	27	26	62	25	34

Q11. Which of the following gases in the atmosphere are good at trapping heat from the Earth's surface? *(items randomized)*

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Carbon dioxide (√)	**45**	59	45	38	23	57	50
Methane (√)	**25**	32	26	23	7	31	27
Water vapor (√)	**12**	18	9	11	8	22	13
Hydrogen	**7**	16	6	9	3	6	5
Oxygen	**7**	17	8	7	2	3	2
Don't know	**42**	21	43	45	73	34	40

Q12. Are each of the following statements definitely true, probably true, probably false, definitely false, or you do not know? *(items randomized)*

Weather often changes from year to year. (T)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Definitely true	**46**	60	43	40	34	55	52
Probably true	**37**	31	42	44	27	32	33
Probably false	**7**	3	7	10	7	6	6
Definitely false	**3**	4	2	1	3	1	5
Don't know	**7**	2	5	5	29	6	5

Climate means the average weather conditions in a region. (T)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Definitely true	**34**	55	32	31	15	34	34
Probably true	**40**	36	42	46	29	39	41
Probably false	**9**	3	11	9	10	12	5
Definitely false	**4**	1	4	3	2	5	10
Don't know	**14**	6	12	11	45	9	11

Climate often changes from year to year. (F)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Definitely true	**26**	35	25	25	25	23	24
Probably true	**36**	26	41	43	28	29	32
Probably false	**19**	16	20	19	12	26	18
Definitely false	**12**	22	9	7	5	15	17
Don't know	**8**	1	5	6	30	8	9

Ocean currents carry heat from the equator toward the north and south poles. (T)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Definitely true	**20**	39	17	12	5	21	30
Probably true	**34**	26	35	48	20	36	28
Probably false	**9**	12	9	8	4	12	5
Definitely false	**3**	1	2	3	1	6	6
Don't know	**34**	22	36	29	70	25	32

Weather means the average climate conditions in a region. (F)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Definitely true	**18**	26	20	18	9	15	17
Probably true	**33**	32	37	42	22	27	22
Probably false	**16**	15	16	20	9	16	14
Definitely false	**18**	23	14	11	9	28	33
Don't know	**16**	5	14	8	52	14	15

Climate and weather mean pretty much the same thing. (F)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Definitely true	**9**	17	7	11	3	5	11
Probably true	**24**	19	25	29	22	26	18
Probably false	**26**	20	31	31	12	25	27
Definitely false	**28**	39	28	20	18	34	36
Don't know	**12**	4	10	8	45	9	8

The atmosphere carries heat from the north and south poles toward the equator. (F)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Definitely true	**6**	17	4	9	2	3	1
Probably true	**21**	22	25	30	10	14	12
Probably false	**17**	12	17	17	9	27	17
Definitely false	**16**	24	14	10	5	25	29
Don't know	**40**	25	41	34	74	32	40

Q13. Are each of the following statements definitely true, probably true, probably false, definitely false or you do not know? *(items randomized)*

In the past, the Earth's climate always shifted gradually between warm and cold periods. (F)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Definitely true	**21**	29	17	15	4	32	36
Probably true	**46**	49	51	56	37	33	34
Probably false	**8**	9	8	10	3	12	6
Definitely false	**4**	6	3	2	0	9	7
Don't know	**21**	7	21	18	56	14	18

Climate changes have played an important role in the advance or collapse of some past human civilizations. (T)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Definitely true	**20**	44	24	14	2	14	11
Probably true	**43**	41	47	49	22	43	43
Probably false	**10**	6	7	13	8	18	11
Definitely false	**4**	1	2	3	1	6	14
Don't know	**23**	8	20	21	67	19	21

The Earth's climate is warmer now than it has ever been before. (F)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Definitely true	**18**	47	25	11	8	2	1
Probably true	**37**	33	48	49	31	19	7
Probably false	**17**	6	10	21	12	32	36
Definitely false	**14**	10	7	8	4	35	38
Don't know	**15**	4	11	12	45	12	18

In the past, rising levels of carbon dioxide in the atmosphere have caused global temperatures to increase. (T)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Definitely true	**14**	44	16	9	4	3	2
Probably true	**43**	39	55	56	19	34	16
Probably false	**11**	5	6	8	6	24	34
Definitely false	**3**	0	1	0	2	8	10
Don't know	**30**	12	23	27	70	31	37

In the past, rising global temperatures have caused carbon dioxide levels in the atmosphere to increase. (T)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Definitely true	**9**	25	9	7	1	4	2
Probably true	**30**	38	36	36	13	24	13
Probably false	**18**	17	15	21	12	22	26
Definitely false	**6**	7	5	3	2	9	13
Don't know	**37**	14	34	33	72	41	47

Compared to the climate of the past million years, the last 10,000 have been unusually warm and stable. (T)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Definitely true	**8**	18	8	7	1	8	5
Probably true	**33**	38	42	36	9	28	16
Probably false	**17**	14	14	20	12	23	20
Definitely false	**6**	8	3	2	3	6	23
Don't know	**37**	22	33	34	75	35	36

The Earth's climate has been pretty much the same for millions of years. (F)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Definitely true	**4**	4	2	3	2	3	10
Probably true	**17**	7	13	22	13	26	22
Probably false	**29**	21	34	38	24	18	20
Definitely false	**38**	62	41	27	16	39	40
Don't know	**13**	7	10	10	45	14	8

The Earth's climate is colder now than it has ever been before. (F)

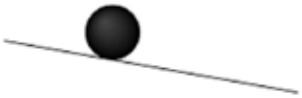
	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Definitely true	**2**	7	2	2	2	1	1
Probably true	**8**	4	10	12	9	6	2
Probably false	**34**	18	36	45	28	30	38
Definitely false	**39**	63	40	30	16	45	39
Don't know	**16**	8	12	12	45	18	20

Q14. The average temperature of the Earth's surface is currently about 58 degrees Fahrenheit. What do you think the average temperature of the Earth's surface was during the last ice age?

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Median	**32**	28	31	32	35	40	40
Std. Dev	**29**	36	31	27	23	24	26

Q15. People disagree about how the climate system works. The five pictures below illustrate five different perspectives. Each picture depicts the Earth's climate system as a ball balanced on a line, yet each one has a different ability to withstand human-caused global warming. Which one of the five pictures best represents your understanding of how the climate system works? *(images randomized)*

Gradual



Earth's climate is slow to change. Global warming will gradually lead to dangerous effects.

Fragile

Earth's climate is delicately balanced. Small amounts of global warming will have abrupt and catastrophic effects.

Stable

Earth's climate is very stable. Global warming will have little to no effects.

Threshold

Earth's climate is stable within certain limits. If global warming is small, climate will return to a stable balance. If it is large, there will be dangerous effects.

Random

Earth's climate is random and unpredictable. We do not know what will happen.

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Gradual	**24**	33	38	20	18	7	1
Fragile	**11**	17	15	12	8	1	5
Stable	**10**	2	1	3	7	25	46
Threshold (√)	**34**	40	35	40	27	36	14
Random	**21**	8	11	24	40	31	34

Q16. Which of the following are "fossil fuels"? *(items randomized)*

Coal (√)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Yes	**80**	84	84	84	46	85	84
No	**5**	6	4	5	8	3	8
Don't know	**15**	10	13	11	46	11	8

Oil (√)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Yes	**76**	87	75	76	44	84	86
No	**7**	4	7	12	4	5	8
Don't know	**17**	9	18	12	52	11	7

Natural gas (√)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Yes	**60**	62	63	62	37	65	61
No	**17**	18	17	21	10	17	21
Don't know	**23**	20	21	18	54	19	19

Wood

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Yes	**28**	28	28	30	17	28	33
No	**51**	57	51	52	28	58	53
Don't know	**21**	14	21	18	54	14	14

Hydrogen

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Yes	**11**	12	14	9	12	12	9
No	**58**	62	52	64	32	69	69
Don't know	**31**	27	34	28	57	19	22

Solar energy

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Yes	**7**	7	8	9	6	7	6
No	**74**	85	73	73	42	79	87
Don't know	**19**	8	19	18	53	14	8

Q17. The energy in fossil fuels originally came from: *(items randomized)*

The fossilized remains of dinosaurs (F)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Definitely true	**23**	46	21	19	14	22	19
Probably true	**24**	15	27	28	11	27	28
Probably false	**12**	10	12	15	3	14	10
Definitely false	**16**	14	14	17	8	21	25
Don't know	**25**	15	27	21	63	16	18

Photosynthesis by plants over millions of years (T)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Definitely true	**20**	36	19	18	8	25	16
Probably true	**32**	22	38	36	16	30	34
Probably false	**9**	11	9	12	2	10	10
Definitely false	**11**	14	8	9	10	15	16
Don't know	**28**	18	27	25	64	20	24

The sun (T)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Definitely true	**11**	15	8	10	7	13	14
Probably true	**18**	14	23	21	6	20	15
Probably false	**18**	19	16	22	7	17	22
Definitely false	**23**	34	19	19	15	32	26
Don't know	**31**	17	33	29	65	19	23

Uranium in the Earth (F)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Definitely true	**3**	10	3	2	2	3	1
Probably true	**17**	20	22	21	6	10	13
Probably false	**19**	19	15	25	8	23	27
Definitely false	**24**	28	21	19	16	41	32
Don't know	**36**	24	39	33	69	23	28

Q18. What gas is produced by the burning of fossil fuels? *(items randomized)*

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Oxygen	**2**	5	2	3	1	1	0
Hydrogen	**4**	3	4	3	1	2	7
Helium	**1**	1	1	1	1	0	0
Carbon dioxide (√)	**67**	80	66	66	38	75	79
Don't know	**26**	11	28	27	61	21	14

Q19. To the best of your knowledge, roughly how much carbon dioxide was in the atmosphere in the year 1850?

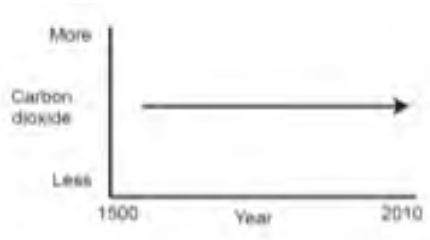
	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
150 parts per million	**10**	21	8	10	8	7	6
290 parts per million (√)	**6**	10	6	8	3	5	5
350 parts per million	**4**	3	2	6	0	6	6
390 parts per million	**2**	0	1	3	2	0	4
450 parts per million	**1**	1	2	0	0	1	1
Don't know	**78**	66	82	72	87	81	79

Q20. Roughly how much carbon dioxide is in the atmosphere today?

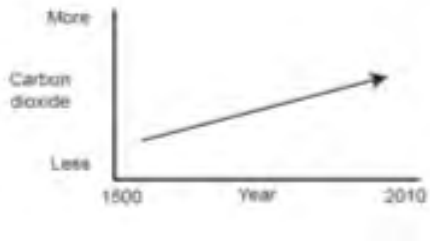
	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
150 parts per million	**2**	4	3	0	0	1	2
290 parts per million	**3**	4	1	3	4	6	1
350 parts per million	**6**	6	5	9	1	5	12
390 parts per million (√)	**7**	13	5	9	4	6	7
450 parts per million	**6**	13	7	10	1	1	2
Don't know	**76**	60	79	70	91	81	77

Q21. Which picture best represents your understanding of how the amount of carbon dioxide in the atmosphere has changed over the past 500 years?[1]

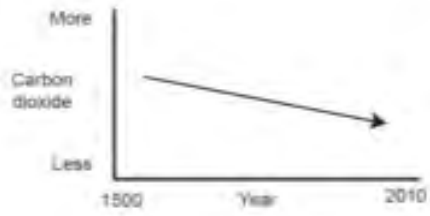
a) No change



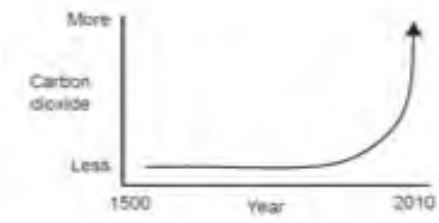
b) Linear increase



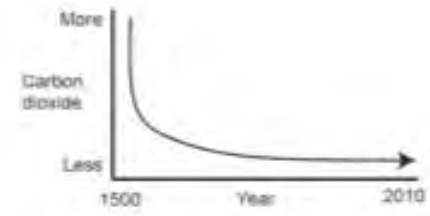
c) Linear decrease



d) Exponential increase



e) Exponential decrease



	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
No change	**8**	2	2	7	9	18	30
Linear increase	**41**	30	43	42	46	47	34
Linear decrease	**7**	3	4	10	10	5	10
Exponential increase (√)	**40**	62	47	36	27	26	23
Exponential decrease	**5**	3	5	5	9	4	4

[1] Labels not provided

Q22a. If we were to stop burning fossil fuels today, the amount of carbon dioxide in the atmosphere would decrease almost immediately. (F)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Definitely true	**5**	15	4	4	3	0	1
Probably true	**32**	36	41	35	16	28	12
Probably false	**30**	27	29	34	10	36	42
Definitely false	**13**	16	10	10	4	21	26
Don't know	**20**	6	16	17	67	15	20

Q22b. If we were to stop burning fossil fuels today, global warming would stop almost immediately. (F)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Definitely true	**2**	5	1	2	0	0	1
Probably true	**14**	21	17	18	6	7	0
Probably false	**37**	39	41	43	17	38	31
Definitely false	**25**	26	21	18	6	41	46
Don't know	**23**	9	19	20	70	14	22

Q23. On average, how long does carbon dioxide stay in the atmosphere once it has been emitted?

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
A few days	**4**	4	2	6	2	4	11
A few years	**13**	14	14	14	1	16	9
A hundred years (√)	**13**	23	15	12	2	7	8
A thousand years (√)	**6**	6	7	8	4	7	4
Don't know	**64**	53	61	60	91	67	69

Q24. Which of the following countries emits the largest total amount of carbon dioxide? *(items randomized)*

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
United States	**34**	40	39	40	16	36	14
China (√)	**36**	42	33	31	15	44	56
India	**2**	3	0	1	3	4	2
Germany	**1**	1	2	1	0	0	0
Japan	**4**	4	4	5	2	2	3
Don't know	**24**	10	23	22	63	13	25

Q25. Which of the following countries emits the most carbon dioxide **per person**? *(items randomized)*

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
United States (√)	**42**	61	44	44	16	47	26
China	**18**	13	22	16	12	19	25
India	**4**	5	3	3	0	6	8
Germany	**1**	1	0	3	0	0	5
Japan	**5**	3	4	8	3	4	3
Don't know	**31**	17	28	27	69	23	33

Q26. How much does each of the following contribute to global warming? *(items randomized)*

Cars and trucks (√)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
A lot	**49**	86	71	44	18	16	10
Some	**24**	11	21	38	17	33	17
A little	**12**	2	3	12	11	34	32
Not at all	**3**	0	0	1	1	4	23
Don't know	**12**	1	6	5	54	12	18

Burning fossil fuels for heat and electricity (√)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
A lot	**41**	78	54	40	12	16	8
Some	**28**	17	32	39	17	31	19
A little	**11**	2	3	12	7	31	27
Not at all	**4**	0	0	0	2	4	27
Don't know	**16**	3	11	9	62	18	19

Deforestation (√)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
A lot	**38**	74	52	27	15	21	12
Some	**25**	15	24	38	12	33	16
A little	**11**	2	5	17	6	22	25
Not at all	**4**	1	2	2	1	6	25
Don't know	**22**	9	18	16	66	19	22

The hole in the ozone layer

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
A lot	**34**	63	49	32	12	6	7
Some	**27**	18	29	37	18	29	17
A little	**12**	9	7	13	9	29	16
Not at all	**8**	3	5	4	2	13	36
Don't know	**19**	8	10	13	59	23	23

Toxic wastes

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
A lot	**32**	64	47	23	18	8	8
Some	**22**	16	23	37	10	16	14
A little	**12**	3	9	18	7	22	15
Not at all	**15**	11	9	11	4	29	38
Don't know	**19**	6	12	12	61	25	26

Aerosol spray cans

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
A lot	**25**	49	36	20	9	7	5
Some	**29**	29	36	40	18	16	15
A little	**22**	17	19	26	13	37	21
Not at all	**10**	2	3	6	3	23	40
Don't know	**14**	3	7	8	57	18	20

Nuclear power plants (*)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
A lot	**23**	45	31	22	13	4	3
Some	**21**	18	24	30	10	14	16
A little	**15**	11	18	18	5	18	15
Not at all	**22**	19	14	17	9	43	47
Don't know	**20**	8	14	14	63	21	20

Volcanic eruptions

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
A lot	**20**	25	20	21	10	23	15
Some	**34**	39	40	43	12	25	23
A little	**21**	22	21	21	12	26	22
Not at all	**6**	4	3	6	2	9	21
Don't know	**19**	10	16	10	65	18	19

The sun

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
A lot	**19**	17	17	15	14	33	23
Some	**24**	29	25	33	11	17	14
A little	**20**	21	21	26	7	17	21
Not at all	**15**	21	19	11	3	13	17
Don't know	**23**	13	19	15	64	20	25

Acid rain

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
A lot	**18**	41	23	17	4	4	5
Some	**23**	21	29	31	8	15	10
A little	**15**	9	14	21	12	21	14
Not at all	**17**	13	12	14	4	32	42
Don't know	**27**	16	22	17	71	28	30

The space program

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
A lot	**10**	16	11	11	6	3	9
Some	**15**	18	18	22	6	8	6
A little	**24**	27	27	28	8	28	13
Not at all	**24**	23	17	23	7	41	47
Don't know	**27**	17	27	15	72	20	26

Cows (√)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
A lot	**9**	22	9	6	5	5	3
Some	**21**	23	26	24	10	19	13
A little	**25**	24	26	33	7	33	18
Not at all	**24**	27	20	23	13	22	47
Don't know	**21**	4	19	14	64	21	20

People who answered "a lot" or "some" to more than one item in question 26 were asked the following question.

Q27. Of the following, which <u>one</u> do you think <u>contributes most</u> to global warming?

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Burning fossil fuels (√)	**25**	39	27	23	9	16	9
Cars and trucks	**20**	20	23	20	16	15	9
The hole in the ozone layer	**13**	8	16	17	14	1	11
Deforestation	**11**	11	10	9	19	19	9
Toxic wastes (nuclear, chemical)	**8**	11	7	9	10	4	7
The sun	**7**	1	4	5	10	25	27
Nuclear power plants	**5**	6	5	6	1	4	4
Volcanic eruptions	**3**	1	2	3	13	4	3
Cows	**3**	3	2	4	1	4	15
Aerosol spray cans (hair spray, deodorant)	**2**	1	2	3	1	5	0
The space program	**2**	0	2	1	3	2	7
Acid rain	**1**	0	1	2	3	0	0
N	***1451***	*266*	*540*	*363*	*70*	*139*	*75*

Q28. The average temperature of the Earth's surface is currently 58 degrees Fahrenheit. What temperature do you think it was **150 years ago?**

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Median	**54**	50	50	50	50	56	58
Std. Dev	**17**	15	16	21	22	14	13

Q29. The average temperature of the Earth's surface is currently 58 degrees Fahrenheit. If no additional actions are taken to reduce global warming, what temperature do you think it will be **by the year 2020?**

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Median	**60**	62	61	60	59	58.5	58
Std. Dev	**17**	20	13	17	22	11	22

Q30. The average temperature of the Earth's surface is currently 58 degrees Fahrenheit. If no additional actions are taken to reduce global warming, what temperature do you think it will be **by the year 2050?**

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Median	**62**	68	68	62	60	59	58
Std. Dev	**21**	19	20	22	28	12	22

Q31. Are each of the following statements definitely true, probably true, probably false, definitely false, or do you not know? *(items randomized)*

Global warming will cause some places to get wetter, while others will get drier. (T)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Definitely true	**18**	47	21	11	3	10	7
Probably true	**50**	39	55	69	24	53	37
Probably false	**7**	2	4	6	4	12	20
Definitely false	**3**	3	2	1	1	1	13
Don't know	**22**	10	18	13	67	25	23

The decade from 2000 to 2009 was warmer than any other decade since 1850. (T)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Definitely true	**12**	39	14	5	3	2	1
Probably true	**39**	47	52	46	13	26	13
Probably false	**14**	3	6	19	3	30	34
Definitely false	**5**	1	3	2	4	10	19
Don't know	**31**	10	26	28	77	32	33

Scientists can't predict the weather more than a few days in advance – they can't possibly predict the climate of the future. (F)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Definitely true	**12**	9	4	11	8	22	35
Probably true	**30**	11	24	41	26	50	34
Probably false	**26**	39	35	29	5	12	12
Definitely false	**13**	36	20	4	2	1	6
Don't know	**19**	5	17	15	60	14	13

Global warming will increase crop yields in some places, and decrease it in others. (T)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Definitely true	**11**	25	10	11	1	8	8
Probably true	**47**	47	52	55	20	50	42
Probably false	**12**	11	12	13	6	15	15
Definitely false	**5**	9	5	2	1	3	9
Don't know	**25**	8	21	19	73	23	27

Scientists' computer models are too unreliable to predict the climate of the future. (F)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Definitely true	**11**	8	3	6	3	20	40
Probably true	**30**	10	25	42	16	58	33
Probably false	**26**	51	33	28	4	10	4
Definitely false	**11**	23	18	4	1	0	7
Don't know	**23**	7	22	20	76	12	16

In the 1970s, most scientists were predicting an ice age. (F)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Definitely true	**10**	14	4	4	3	24	27
Probably true	**25**	25	24	32	6	31	25
Probably false	**14**	18	17	18	4	11	7
Definitely false	**4**	7	4	4	0	1	7
Don't know	**47**	37	51	42	87	33	36

The Earth's climate has changed naturally in the past, therefore humans are not the cause of global warming. (F)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Definitely true	**9**	7	2	6	2	19	34
Probably true	**24**	6	11	36	10	53	43
Probably false	**29**	24	45	36	12	14	4
Definitely false	**20**	63	29	7	4	0	6
Don't know	**18**	1	14	16	73	14	13

Global warming will cause temperatures to increase by roughly the same amount in all countries. (F)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Definitely true	**5**	15	4	6	0	0	1
Probably true	**27**	28	31	36	12	22	10
Probably false	**32**	20	35	34	12	43	40
Definitely false	**12**	24	12	9	1	11	21
Don't know	**25**	14	19	16	75	24	28

Any recent global warming is caused by the sun. (F)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Definitely true	**4**	6	4	3	1	7	7
Probably true	**15**	7	9	21	6	23	29
Probably false	**34**	34	40	45	8	32	22
Definitely false	**19**	41	27	10	3	6	12
Don't know	**28**	12	21	21	82	33	31

The record snowstorms this winter in the eastern United States prove that global warming is not happening. (F)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Definitely true	**3**	6	0	1	1	5	10
Probably true	**15**	3	6	22	10	32	32
Probably false	**32**	23	37	42	13	32	22
Definitely false	**26**	64	37	11	3	10	15
Don't know	**24**	5	19	23	74	22	22

The Earth is actually cooling, not warming. (F)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Definitely true	**3**	5	1	3	0	3	12
Probably true	**12**	4	7	14	6	24	27
Probably false	**31**	34	38	41	8	31	8
Definitely false	**21**	49	31	10	9	2	8
Don't know	**33**	8	23	33	77	39	44

Global warming is happening, but will be more beneficial than harmful.

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Definitely true	**2**	6	1	2	0	1	1
Probably true	**10**	3	4	16	5	18	18
Probably false	**31**	17	38	43	11	34	26
Definitely false	**31**	72	45	15	2	5	25
Don't know	**26**	2	13	23	82	42	30

Q32. Which of the following statements is correct?

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
All of the glaciers on Earth are melting away	**11**	30	17	4	3	3	0
Most of the glaciers on Earth are melting away (√)	**21**	42	29	20	5	9	3
Some of the glaciers on Earth are melting away	**48**	27	47	63	32	57	58
None of the glaciers on Earth are melting away	**4**	1	0	2	0	10	18
Don't know	**16**	0	7	12	61	22	21

People who answered "all", "most", or "some of the glaciers on Earth are melting away" to question 32 were asked the following question.

Q33. Over the past 100 years, has the speed of glacier melting increased, decreased, or stayed the same?

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Increased (√)	**84**	100	95	76	81	65	46
Stayed the same	**14**	0	4	19	15	34	52
Decreased	**2**	0	1	5	4	1	2
N	***1600***	*273*	*570*	*386*	*80*	*161*	*130*

Q34. Which of the following can cause global sea levels to rise? *(items randomized)*

Melting of land ice in Antarctica (T)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Definitely true	**37**	81	49	26	7	20	14
Probably true	**39**	16	42	55	28	42	39
Probably false	**5**	0	1	6	1	12	18
Definitely false	**2**	0	1	2	1	2	9
Don't know	**17**	3	8	12	63	24	20

Melting of sea ice on the Arctic Ocean (T)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Definitely true	**36**	80	46	27	9	17	13
Probably true	**40**	16	43	54	31	40	44
Probably false	**6**	0	2	7	1	16	16
Definitely false	**3**	3	1	3	0	4	10
Don't know	**16**	1	9	10	59	23	17

Melting of mountain glaciers (T)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Definitely true	**32**	71	41	24	9	13	11
Probably true	**41**	23	46	56	21	35	40
Probably false	**9**	3	3	8	3	26	25
Definitely false	**2**	2	0	1	3	4	9
Don't know	**16**	1	10	11	64	22	16

Warmer ocean temperatures (T)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Definitely true	**24**	63	27	15	7	13	10
Probably true	**36**	21	41	50	13	35	32
Probably false	**15**	7	11	17	8	25	25
Definitely false	**4**	1	4	3	2	3	13
Don't know	**22**	8	16	15	71	25	20

Increased evaporation (F)

	Nat'l Average	*Alarmed (14%)*	*Concerned (31%)*	*Cautious (23%)*	*Disengaged (10%)*	*Doubtful (12%)*	*Dismissive (11%)*
Definitely true	**9**	26	11	6	3	2	1
Probably true	**17**	13	21	27	7	9	9
Probably false	**28**	21	26	35	10	32	39
Definitely false	**19**	19	20	14	4	31	24
Don't know	**28**	20	22	18	76	26	28

People who answered "definitely" or "probably true" to more than one cause in question 34 were asked the following question.

Q35. Of the causes you selected, which **one** has contributed the most to sea level rise so far?

	Nat'l Average	*Alarmed (14%)*	*Concerned (31%)*	*Cautious (23%)*	*Disengaged (10%)*	*Doubtful (12%)*	*Dismissive (11%)*
Melting of mountain glaciers	**19**	12	20	22	25	13	21
Melting of sea ice on the Arctic Ocean	**34**	37	37	27	33	40	21
Melting of land ice in Antarctica	**24**	20	23	27	12	24	35
Warmer ocean temperatures (√)	**22**	28	18	24	29	20	23
Increased evaporation	**2**	3	2	1	1	2	0
N	***1482***	*265*	*531*	*362*	*73*	*134*	*117*

Q36. How much do scientists estimate that global sea levels rose from 1900 to 2000?

	Nat'l Average	*Alarmed (14%)*	*Concerned (31%)*	*Cautious (23%)*	*Disengaged (10%)*	*Doubtful (12%)*	*Dismissive (11%)*
10-12 feet	**3**	7	3	2	2	2	0
3-4 feet	**11**	18	14	12	2	6	3
6-9 inches (√)	**26**	29	27	27	10	33	22
Zero	**4**	3	2	2	0	6	15
Don't know	**57**	43	54	57	88	52	60

Q37. If no additional actions are taken to reduce global warming, how much do you think global sea levels will rise by the year 2100?

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
10-12 feet	**13**	37	17	9	2	3	2
3-4 feet (√)	**17**	24	23	21	3	14	2
6-9 inches (√)	**16**	10	16	24	2	17	16
Zero	**6**	2	1	2	1	15	31
Don't know	**48**	28	43	45	93	51	49

Q38. How much, if anything, have you read or heard about coral bleaching?

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
A lot	**1**	3	0	2	0	1	1
Some	**9**	19	8	10	1	8	9
A little	**15**	30	16	11	4	12	14
Nothing	**75**	48	76	78	96	79	76

People who answered "a lot," "some," or "a little" to question 38 were asked the following question.

Q39. Which of the following causes coral bleaching? *(items randomized)*

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Warmer ocean temperatures (√)	**54**	68	52	38	25	46	57
Chemical spills in the ocean	**11**	8	12	14	0	15	15
Acid rain	**8**	2	8	20	13	10	0
Overfishing	**3**	3	2	5	0	4	2
Don't know	**24**	19	27	22	63	25	26
N	***491***	*141*	*146*	*94*	*8*	*48*	*53*

Q40. How much, if anything, have you read or heard about ocean acidification?

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
A lot	**1**	4	1	1	0	0	0
Some	**6**	10	5	7	3	7	4
A little	**17**	32	16	17	3	16	12
Nothing	**77**	54	78	76	94	78	84

People who answered "a lot", "some", or "a little" to question 40 were asked the following question.

Q41. Which of the following causes ocean acidification? *(items randomized)*

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Absorption of carbon dioxide by the ocean (√)	**32**	48	19	25	54	31	27
Chemical spills in the ocean	**16**	21	12	20	0	8	24
Acid rain	**19**	9	31	18	23	23	12
Warmer ocean temperatures	**13**	7	12	18	0	25	9
Don't know	**21**	15	27	19	23	14	29
N	***467***	*129*	*130*	*108*	*13*	*52*	*34*

Q42. How much do you think each of the following actions would reduce global warming if they were done **worldwide**? *(items randomized)*

Switching from fossil fuels to renewable energy (wind, solar, geothermal) (T)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
A lot	**43**	89	64	33	12	13	7
Some	**20**	8	19	33	14	25	12
A little	**12**	2	5	20	7	29	21
Not at all	**8**	0	1	3	1	18	46
Don't know	**16**	1	11	12	66	17	14

Planting trees (T)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
A lot	**40**	74	55	32	19	21	9
Some	**25**	17	28	36	13	26	19
A little	**16**	8	8	21	10	30	26
Not at all	**6**	0	1	2	1	9	35
Don't know	**13**	2	8	9	57	15	11

Reducing tropical deforestation (T)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
A lot	**37**	78	49	29	18	16	12
Some	**22**	13	24	31	12	29	10
A little	**14**	3	8	19	3	29	25
Not at all	**6**	0	1	5	1	8	37
Don't know	**21**	7	18	17	67	17	17

Reducing toxic waste (nuclear, chemical) (F)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
A lot	**30**	66	40	24	10	6	9
Some	**20**	14	26	26	17	12	4
A little	**17**	10	13	30	4	22	17
Not at all	**16**	7	7	7	7	38	53
Don't know	**18**	2	14	13	62	22	18

Switching from gasoline to electric cars (T)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
A lot	**28**	62	40	20	12	8	4
Some	**28**	24	36	39	16	20	9
A little	**19**	8	12	30	8	34	20
Not at all	**10**	3	2	1	3	25	53
Don't know	**15**	3	10	10	62	14	14

Driving less (T)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
A lot	**27**	60	41	17	9	4	6
Some	**28**	25	37	36	18	21	13
A little	**21**	11	11	33	15	44	21
Not at all	**9**	3	3	5	3	14	46
Don't know	**14**	1	8	9	55	17	15

Increasing public transportation (T)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
A lot	**18**	49	26	12	4	3	3
Some	**29**	28	37	38	14	25	11
A little	**20**	14	17	29	13	29	14
Not at all	**16**	8	10	10	5	27	56
Don't know	**16**	2	10	11	63	17	16

Switching from regular (incandescent) to compact fluorescent light bulbs (T)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
A lot	**16**	43	22	13	5	1	0
Some	**28**	30	41	32	20	12	7
A little	**25**	24	22	35	13	38	14
Not at all	**14**	2	4	9	5	32	58
Don't know	**16**	1	11	11	57	17	21

Insulating buildings (T)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
A lot	**16**	41	20	14	5	6	3
Some	**27**	30	34	33	13	17	13
A little	**22**	20	20	27	7	38	15
Not at all	**15**	5	9	10	8	23	53
Don't know	**20**	4	18	16	68	16	17

Switching from fossil fuels to nuclear power (T)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
A lot	**16**	32	22	11	2	11	7
Some	**26**	24	30	37	12	20	12
A little	**17**	15	13	21	4	33	22
Not at all	**13**	11	8	7	6	20	40
Don't know	**29**	19	28	25	76	17	19

Banning aerosol spray cans (F)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
A lot	**16**	39	23	13	3	4	1
Some	**25**	33	32	31	15	10	7
A little	**28**	24	32	35	9	31	17
Not at all	**15**	2	4	8	7	35	61
Don't know	**17**	2	8	13	66	20	14

Stop punching holes in the ozone layer with rockets (F)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
A lot	**16**	33	22	10	8	5	6
Some	**13**	14	14	23	6	6	1
A little	**14**	12	12	21	6	16	9
Not at all	**32**	29	26	28	6	52	66
Don't know	**26**	13	26	18	74	20	18

Placing a large tax on all fossil fuels (T)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
A lot	**10**	34	10	5	4	1	3
Some	**19**	35	26	22	4	9	2
A little	**19**	10	24	29	3	19	9
Not at all	**29**	14	18	26	17	54	70
Don't know	**24**	7	23	19	72	18	16

Having at most 2 children per family (T)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
A lot	**10**	28	11	6	4	3	1
Some	**15**	23	18	18	7	9	5
A little	**16**	18	19	22	7	11	4
Not at all	**36**	22	28	34	19	55	74
Don't know	**24**	8	25	20	63	22	16

Fertilizing the ocean to make algae grow faster (*)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
A lot	**7**	21	8	4	4	1	3
Some	**14**	15	18	20	5	9	1
A little	**15**	14	15	23	4	20	8
Not at all	**21**	14	17	13	8	35	60
Don't know	**43**	37	43	41	79	35	27

Stop eating beef (T)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
A lot	**4**	14	5	1	1	0	1
Some	**10**	22	13	11	4	3	2
A little	**18**	25	19	23	9	15	3
Not at all	**47**	32	42	49	21	65	81
Don't know	**22**	7	22	17	66	17	12

Using airplanes to scatter dust high in the atmosphere (*)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
A lot	**2**	10	2	2	1	0	0
Some	**7**	11	7	11	1	3	4
A little	**10**	10	8	16	6	8	7
Not at all	**37**	31	34	34	13	54	66
Don't know	**44**	39	49	38	80	36	23

People who answered "a lot," "some" or "a little" for more than one action in question 42 were asked the following question.

Q43. Of the following actions, which **one** do you think would reduce global warming the most?

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Switching from fossil fuels to renewable energy (wind, solar, geothermal)	**36**	54	41	33	19	17	14
Reducing tropical deforestation	**13**	12	12	10	26	18	16
Switching from gasoline to electric cars	**10**	8	10	11	18	4	5
Planting trees	**9**	4	6	10	7	14	28
Reducing toxic waste (nuclear, chemical)	**8**	10	6	11	8	3	5
Stop punching holes in the ozone layer with rockets	**6**	3	8	3	6	6	6
Switching from fossil fuels to nuclear power	**6**	2	3	4	0	27	15
Driving less	**5**	2	6	3	9	6	2
Banning aerosol spray cans	**2**	2	2	4	0	1	6
Increasing public transportation	**1**	0	2	1	1	0	1
Switching from regular (incandescent) to compact fluorescent light bulbs	**1**	1	1	3	5	0	0
Insulating buildings	**1**	0	1	2	0	0	0
Having at most 2 children per family	**1**	1	1	2	0	1	2
Placing a large tax on all fossil fuels	**1**	2	1	1	0	0	0
Fertilizing the ocean to make algae grow faster	**1**	1	0	0	0	3	0
Stop eating beef	**1**	0	1	1	0	0	0
Using airplanes to scatter dust high in the atmosphere	**0**	0	0	1	1	0	0
N	***1470***	*263*	*536*	*350*	*85*	*148*	*86*

44. How much do you trust or distrust the following as a source of information about global warming? *(items randomized)*

The National Oceanic and Atmospheric Administration (NOAA)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Strongly trust	**19**	60	24	8	7	4	3
Somewhat trust	**59**	35	69	77	66	47	36
Somewhat distrust	**16**	3	7	13	25	38	39
Strongly distrust	**5**	2	1	3	3	12	22

Science programs on television (PBS, Discovery Channel)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Strongly trust	**16**	56	19	6	4	4	0
Somewhat trust	**56**	39	70	69	66	36	20
Somewhat distrust	**21**	2	10	22	23	49	45
Strongly distrust	**7**	3	1	4	7	12	35

The National Science Foundation (NSF)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Strongly trust	**15**	45	18	7	3	2	2
Somewhat trust	**59**	49	72	70	66	43	26
Somewhat distrust	**20**	4	9	21	27	41	46
Strongly distrust	**6**	2	1	2	5	15	25

Scientists

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Strongly trust	**15**	50	16	8	5	4	5
Somewhat trust	**57**	44	70	68	65	38	27
Somewhat distrust	**21**	4	13	21	27	43	41
Strongly distrust	**6**	2	1	3	3	15	27

Natural history museums

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Strongly trust	**12**	41	12	4	7	4	4
Somewhat trust	**61**	46	75	68	62	47	40
Somewhat distrust	**22**	10	10	25	27	42	39
Strongly distrust	**5**	3	2	4	4	6	17

Science museums

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Strongly trust	**12**	38	13	6	7	4	4
Somewhat trust	**60**	54	74	65	54	45	34
Somewhat distrust	**23**	7	11	26	29	43	43
Strongly distrust	**6**	2	2	4	10	7	19

Family and friends

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Strongly trust	**12**	18	13	8	6	10	14
Somewhat trust	**58**	60	61	54	62	51	55
Somewhat distrust	**23**	19	20	29	28	28	17
Strongly distrust	**8**	3	6	9	4	12	14

Environmental organizations

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Strongly trust	**12**	44	13	5	3	2	0
Somewhat trust	**46**	49	67	49	50	11	4
Somewhat distrust	**26**	4	17	38	41	44	26
Strongly distrust	**16**	3	3	8	6	43	70

The National Aeronautics and Space Administration (NASA)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Strongly trust	**11**	28	12	5	6	8	4
Somewhat trust	**58**	54	64	62	62	47	45
Somewhat distrust	**24**	12	21	28	28	32	29
Strongly distrust	**7**	7	3	5	4	12	22

The Environmental Protection Agency (EPA)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Strongly trust	**11**	31	15	6	4	0	1
Somewhat trust	**50**	54	62	62	61	16	12
Somewhat distrust	**25**	11	18	26	25	49	37
Strongly distrust	**14**	4	5	7	10	35	50

University professors

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Strongly trust	**10**	34	11	6	5	1	0
Somewhat trust	**54**	57	73	59	51	20	20
Somewhat distrust	**25**	7	16	29	38	45	35
Strongly distrust	**11**	2	1	6	6	34	46

Zoos and aquariums

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Strongly trust	**9**	34	10	3	5	3	0
Somewhat trust	**58**	55	71	60	58	39	40
Somewhat distrust	**26**	9	16	32	32	46	41
Strongly distrust	**7**	3	3	5	5	12	20

School teachers

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Strongly trust	**6**	13	6	7	5	1	1
Somewhat trust	**53**	67	69	55	52	22	23
Somewhat distrust	**29**	16	22	31	36	53	34
Strongly distrust	**12**	5	3	8	8	24	43

Television weather reporters

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Strongly trust	**4**	12	5	1	4	1	0
Somewhat trust	**46**	51	55	52	56	23	21
Somewhat distrust	**38**	32	33	40	34	51	47
Strongly distrust	**12**	5	7	7	7	25	32

Military leaders (generals and admirals)

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Strongly trust	**3**	4	3	2	3	3	2
Somewhat trust	**39**	40	34	44	46	34	39
Somewhat distrust	**42**	31	49	44	39	46	33
Strongly distrust	**16**	25	14	10	13	17	27

The mainstream news media

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Strongly trust	**2**	8	2	0	3	0	0
Somewhat trust	**33**	39	43	35	40	13	8
Somewhat distrust	**40**	33	42	51	42	29	28
Strongly distrust	**26**	20	13	14	15	58	64

Q45. Over the past 12 months, how many times have you visited each of the following?

A movie theater

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
More than 5	**15**	19	15	18	9	14	13
3-5	**17**	22	18	18	10	9	22
1-2	**32**	33	36	25	27	41	23
0	**36**	27	31	39	54	36	41

A nature center

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
More than 5	**3**	9	2	1	2	2	3
3-5	**5**	9	7	3	1	4	3
1-2	**29**	39	30	27	17	28	29
0	**63**	44	61	69	80	65	67

A zoo or aquarium

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
More than 5	**2**	4	1	1	2	2	3
3-5	**4**	9	4	4	1	4	2
1-2	**37**	45	37	35	22	37	43
0	**57**	42	58	61	76	57	53

A science or technology museum

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
More than 5	**1**	3	1	0	1	1	0
3-5	**3**	10	3	1	0	3	2
1-2	**24**	33	25	22	11	26	29
0	**71**	53	72	77	88	71	69

A natural history museum

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
More than 5	**1**	4	1	1	1	1	0
3-5	**3**	7	3	1	2	2	1
1-2	**23**	32	24	22	14	20	24
0	**73**	57	72	76	84	78	75

Q46. Have you ever attended the following at a science center or museum?

A lecture about global warming

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Yes	**8**	22	7	8	1	5	3
No	**92**	78	93	92	100	95	97

An exhibit about global warming

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Yes	**14**	36	14	13	2	9	9
No	**86**	64	86	88	98	91	91

An event with hands-on activities for children and families about global warming

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Yes	**8**	17	8	9	1	8	2
No	**92**	83	92	91	99	92	99

Q47. How much have you learned about global warming from each of the following sources?

Television

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
A lot	**17**	39	20	12	6	8	11
Some	**45**	46	50	53	28	33	38
A little	**26**	10	26	29	37	38	19
Nothing	**12**	5	4	6	29	21	32

Internet

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
A lot	**12**	30	11	6	6	8	13
Some	**32**	33	37	34	11	33	27
A little	**21**	18	23	25	16	18	16
Nothing	**36**	18	29	35	68	41	44

Books or magazines

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
A lot	**9**	30	7	3	2	4	9
Some	**30**	44	33	29	15	25	21
A little	**29**	18	36	34	17	34	20
Nothing	**33**	8	25	34	66	37	51

Newspapers

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
A lot	**6**	16	6	7	1	2	6
Some	**36**	43	42	39	23	27	26
A little	**29**	27	32	28	20	37	27
Nothing	**28**	15	20	26	56	34	41

Family and friends

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
A lot	**6**	17	4	5	2	3	7
Some	**24**	31	26	22	15	18	32
A little	**39**	46	42	41	24	38	29
Nothing	**31**	5	29	32	59	41	33

Schools

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
A lot	**6**	16	4	9	1	1	3
Some	**17**	31	19	14	11	13	7
A little	**22**	17	29	28	12	17	9
Nothing	**55**	37	48	49	76	70	81

Radio

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
A lot	**5**	12	3	4	1	4	12
Some	**20**	38	21	18	12	13	18
A little	**30**	22	34	34	17	36	31
Nothing	**44**	29	42	44	71	47	39

Museums, zoos or aquariums

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
A lot	**5**	19	4	2	1	0	5
Some	**16**	27	18	18	10	10	4
A little	**25**	27	29	28	13	23	18
Nothing	**54**	26	49	52	77	67	73

Movies

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
A lot	**4**	10	3	5	2	0	3
Some	**15**	29	18	13	9	6	7
A little	**23**	26	34	22	15	16	4
Nothing	**58**	35	46	60	75	78	86

Government agencies

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
A lot	**3**	9	2	3	1	1	6
Some	**22**	44	26	20	11	10	13
A little	**33**	30	38	40	17	34	24
Nothing	**41**	17	34	38	72	55	58

Q48. How closely do you follow news about the environment?

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Very closely	**7**	27	4	2	1	6	5
Somewhat closely	**32**	55	41	22	21	20	23
A little	**45**	18	46	58	37	54	44
Not at all	**16**	1	9	18	41	21	28

Q49. How closely do you follow news about the local weather forecast?

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Very closely	**32**	45	33	27	24	29	30
Somewhat closely	**39**	33	40	39	36	43	42
A little	**22**	15	22	27	23	21	22
Not at all	**7**	7	5	7	17	7	6

Q50. How much had you thought about global warming before today?

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
A lot	**17**	63	8	6	7	14	15
Some	**35**	29	55	33	11	30	22
A little	**33**	9	31	44	38	38	39
Not at all	**15**	0	6	17	44	18	24

Q51. How important is the issue of global warming to you personally?

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Extremely important	**7**	43	3	0	0	0	1
Very important	**20**	54	32	5	7	2	1
Somewhat important	**38**	3	60	54	56	11	4
Not too important	**21**	0	5	35	27	49	31
Not at all important	**14**	0	0	5	11	38	64

Q52. On some issues people feel that they have all the information thy need in order to form a firm opinion, while on other issues they would like more information before making up their mind. For global warming, where would you place yourself?

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
I need a lot more information	**25**	23	30	27	37	21	9
I need some more information	**26**	25	36	29	22	15	6
I need a little more information	**25**	28	25	31	17	26	13
I do not need any more information	**24**	24	10	14	25	38	73

Q53. If you wanted to learn more about global warming, where would you go to get more information?

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Internet	**61**	73	64	59	41	58	65
Television programs	**44**	54	55	40	43	29	25
Books or magazines	**37**	67	35	33	20	37	32
Websites of gov't offices like NASA & NOAA	**34**	57	38	29	24	24	22
Environmental groups	**28**	68	35	22	17	9	4
Newspapers	**25**	36	28	25	21	20	13
Your local weather forecast	**21**	29	21	23	19	11	16
Your family and friends	**16**	24	13	10	16	21	18
Museums, zoos or aquariums	**15**	39	18	10	8	7	2
Radio programs	**13**	20	14	8	13	11	19
Schools	**10**	20	11	8	12	2	3
Movies	**5**	11	7	3	5	0	1

People who selected at least one information source in question 53 were shown just their selections and asked the following question.

Q54. Of the following, which <u>one</u> would you go to first to learn more about global warming?

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Internet	**38**	36	33	41	31	45	53
Television programs	**16**	15	18	17	25	8	10
Websites of gov't offices like NASA & NOAA	**12**	14	15	12	10	12	8
Environmental groups	**9**	20	12	7	6	1	2
Books or magazines	**8**	7	8	8	8	12	8
Your local weather forecast	**4**	2	3	7	6	3	6
Newspapers	**3**	1	4	3	7	2	2
Your family and friends	**3**	0	2	1	5	8	6
Museums, zoos or aquariums	**2**	3	2	1	1	2	1
Radio programs	**2**	1	1	0	1	6	7
Schools	**1**	1	2	1	1	2	0
Movies	**1**	0	1	2	2	0	0
N	***1920***	*278*	*611*	*426*	*186*	*221*	*200*

Q55A. How much do you agree or disagree with the following statement?

"I could easily change my mind about global warming."

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Strongly agree	**5**	3	4	4	18	3	1
Somewhat agree	**32**	3	28	56	55	27	16
Somewhat disagree	**36**	15	49	34	21	48	29
Strongly disagree	**28**	79	20	6	6	23	55

Q55B. How much do you agree or disagree with the following statement?

"Schools should teach our children about the causes, consequences and potential solutions to global warming."

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Strongly agree	**35**	85	50	21	23	3	0
Somewhat agree	**40**	10	42	65	52	38	16
Somewhat disagree	**14**	3	5	12	22	32	34
Strongly disagree	**11**	2	3	3	3	27	51

Q55C. How much do you agree or disagree with the following statement?

"Our government should establish programs to teach Americans about global warming."

	Nat'l Average	Alarmed (14%)	Concerned (31%)	Cautious (23%)	Disengaged (10%)	Doubtful (12%)	Dismissive (11%)
Strongly agree	**27**	70	41	13	16	3	1
Somewhat agree	**41**	24	50	65	50	19	8
Somewhat disagree	**17**	4	6	19	29	33	31
Strongly disagree	**14**	2	3	3	6	45	60

Appendix: Answer Key

Q1. Recently, you may have noticed that global warming has been getting some attention in the news. Global warming refers to the idea that the world's average temperature has been increasing over the past 150 years, may be increasing more in the future, and that the world's climate may change as a result. What do you think? Do you think that global warming is happening? [Correct answer: Yes]

For example, see: U.S. Global Change Research Program (2009) Global Climate Change Impacts in the United States. p. 9; IPCC, 2007: Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, Pachauri, R.K and Reisinger, A. (eds.)]. IPCC, Geneva, Switzerland, p. 30; Matson, P.A., Dietz, T., Abdalati, W., Busalacchi, Jr., A.J., Caldeira, K., Corell, R.W., DeFries, R.S., Fung, I.Y., Gaines, S., Hornberger, G.M., Lemos, M.C., Moser, S.C., Moss, R.H., Parson, E.A., Ravishankara, A.R., Schmitt, R.W., Turner, II, B.L., Washington, W.M., Weyant, J.P., Whelan, D.A. (2010) Advancing the science of climate change. National Academies Press, Washington, D.C., p. 506.

Q4. Assuming global warming is happening, do you think it is… [Correct answer: caused mostly by human activities]

For example, see: U.S. Global Change Research Program (2009) Global Climate Change Impacts in the United States. p. 13; IPCC, 2007: Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, Pachauri, R.K and Reisinger, A. (eds.)]. IPCC, Geneva, Switzerland, p. 39; Modern Global Climate Change. Karl, Thomas R. and Trenberth, Kevin E. (5 December 2003) *Science* **302** (5651) 1719-1723.

Q5. Which comes closer to your own view? [Best answer: most scientists think global warming is happening]

For example, see: Anderegg, W., Prall, J., Harold, J. and Schneider, S. (2010) Expert credibility in climate change. Proceedings of the National Academy of Sciences of the United States of America, p. 1; Oreskes, N. (2004) The Scientific Consensus on Climate Change *Science* **306** (5702), 1686.

Q9. The "greenhouse effect" refers to: *(order of items randomized)* [Correct answer: gases in the atmosphere that trap heat]

For example, see: U.S. Global Change Research Program (2009) Global Climate Change Impacts in the United States. p. 14; Le Treut, H., R. Somerville, U. Cubasch, Y. Ding, C. Mauritzen, A. Mokssit, T. Peterson and M. Prather, 2007: Historical Overview of Climate Change. In: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 115-116.

Q10. How much can each of the following affect the average global temperature of the Earth? ***(order of items randomized)*** **[Correct answers: greenhouse gases in the atmosphere, changes in the Earth's orbit around the sun, volcanic eruptions, the amount of dust in the atmosphere, clouds, sunspots, and whether the Earth's surface is light or dark colored. Incorrect answers: earthquakes and the phases of the moon.]**

> For example, U.S. Global Change Research Program (2009) Global Climate Change Impacts in the United States. p. 14-16; see: Le Treut, H., R. Somerville, U. Cubasch, Y. Ding, C. Mauritzen, A. Mokssit, T. Peterson and M. Prather, 2007: Historical Overview of Climate Change. In: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 96-97; 107-108; Lean, Judith L. 2010. Cycles and trends in solar irradiance and climate. *Wiley Interdisciplinary Reviews: Climate Change.* Vol 1, Issue 1. pp 111-122. Dec 22, 2009. doi:10.1002/wcc.018.

Q11. Which of the following gases in the atmosphere are good at trapping heat from the Earth's surface? ***(order of items randomized)*** **[Correct answers: carbon dioxide, methane, and water vapor. Incorrect answers: oxygen and hydrogen.]**

> For example, see: U.S. Global Change Research Program (2009) Global Climate Change Impacts in the United States. p. 14-16; Le Treut, H., R. Somerville, U. Cubasch, Y. Ding, C. Mauritzen, A. Mokssit, T. Peterson and M. Prather, 2007: Historical Overview of Climate Change. In: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 115-116.

Q12. Are each of the following statements definitely true, probably true, probably false, definitely false, or you do not know? ***(order of items randomized)***

> For the following 5 items, for example, see: Le Treut, H., R. Somerville, U. Cubasch, Y. Ding, C. Mauritzen, A. Mokssit, T. Peterson and M. Prather, 2007: Historical Overview of Climate Change. In: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 104-105.

- **Weather often changes from year to year [true]**
- **Climate is the average weather conditions of a region [true]**
- **Climate often changes from year to year [false]**
- **Weather means the average climate conditions for a region [false]**

- **Climate and weather mean pretty much the same thing [false]**

- **Ocean currents carry heat from the equator to the north and south poles [true]**

  For example, see: Trenberth, K. E. and J. M. Caron, 2001 Estimates of meridional atmosphere and ocean heat transports *Journal of Climate*, **14**, 3433-3443; Morgan, G. and Smuts, T. (1994) Global warming and climate change: More on 'What is climate change?.' Carnegie Mellon University, Department of Engineering and Public Policy. http://www.gcrio.org/gwcc/booklet1.html

- **The atmosphere carries heat from the north and south poles toward the equator [false]**

  For example, see: Barry, L., Craig, G. C., & Thuburn, J. (2002). Poleward heat transport by the atmospheric heat engine. *Nature, 415*(6873), 774-777; Trenberth, K. E. and J. M. Caron, 2001 Estimates of meridional atmosphere and ocean heat transports *Journal of Climate*, **14**, 3433-3443.

Q13. Are each of the following statements definitely true, probably true, probably false, definitely false or you do not know? ***(order of items randomized)***

- **In the past, the Earth's climate always shifted gradually between warm and cold periods [false]**

  For example, see: U.S. Global Change Research Program (2009) Global Climate Change Impacts in the United States. p. 26; Committee on Abrupt Climate Change, National Research Council (2002) Abrupt climate change: Inevitable surprises, National Academies Press, 244 p.; Alley, R.B., Marotzke, J., Nordhaus, W.D., Overpeck, J.T., Peteet, D.M., Pielke Jr., R.A., Pierrehumbert, R.T., Rhines, P.B., Stocker, T.F., Talley, L.D., Wallace, J.M. (2003) Abrupt climate change. *Science* **299**, 2005-2010.

- **Climate changes have played an important role in the advance or collapse of some past human civilizations [true]**

  For example, see: Weiss, H. and Bradley, R. S. (2001) Archaeology-what drives societal collapse? *Science* **291**, 609–610; deMenocal, P.B. (2001) Cultural responses to climate change during the late Holocene. *Science* **292**, p. 667-673.

- **The Earth's climate is warmer now that it has ever been before [false]**

  For example, see: Zachos, J., Pagani, M., Sloan, L., Thomas, E., Billups, K. (2001) Trends, Rhythms, and Aberrations in Global Climate 65 Ma to Present. *Science* **292**(5517) p. 686-693; IPCC (2007) *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)], p. 449.

- **In the past, rising levels of carbon dioxide in the atmosphere have caused global temperatures to increase [true]**

  For example, see: U.S. Global Change Research Program (2009) Global Climate Change Impacts in the United States. p.16; Caillon, N., Severinghaus, J.P., Jouzel, J., Barnola, J-M., Kang, J., Lipenkov, V.Y. (2003) Timing of Atmospheric CO2 and Antarctic Temperature Changes Across Termination III. *Science* **299**, p. 1728-1731; Monnin, E., Indermühle, A., Dällenbach, A., Flückiger, J., Stauffer, B., Stocker, T.F., Raynaud, D., Barnola, J.-M., (2001) Atmospheric CO_2 concentrations over the Last Glacial Termination. *Science* **291**(5501), p. 112-114; Lorius, C., Jouzel, J., Raynaude, D., Hansen, J., Le Treut, H. (1990) The ice-core record: Climate sensitivity and future greenhouse warming. *Nature* **347**, p. 139-145.

- **In the past, rising global temperatures have caused carbon dioxide levels in the atmosphere to increase [true]**

  For example, see: U.S. Global Change Research Program (2009) Global Climate Change Impacts in the United States. p.16; Stott, L., Timmermann, A., Thunell, R. (2007) Southern Hemisphere and Deep-Sea Warming Led Deglacial Atmospheric CO2 Rise and Tropical Warming. *Science* **319**(5849) p. 435-438; Siegenthaler, U., Stocker, T. F., Monnin, E., Luthi, D., Schwander, J., Stauffer, B., et al. (2005). Stable carbon cycle-climate relationship during the late Pleistocene. *Science, 310*(5752), 1313-1317; Caillon, N., Severinghaus, J.P., Jouzel, J., Barnola, J-M., Kang, J., Lipenkov, V.Y. (2003) Timing of Atmospheric CO2 and Antarctic Temperature Changes Across Termination III. *Science* **299**, p. 1728-1731; Monnin, E., Indermühle, A., Dällenbach, A., Flückiger, J., Stauffer, B., Stocker, T.F., Raynaud, D., Barnola, J.-M., (2001) Atmospheric CO_2 concentrations over the Last Glacial Termination. *Science* **291**(5501), p. 112-114.

- **Compared to the climate of the past million years, the last 10,000 have been unusually warm and stable [true]**

  For example, see: Petit, J. R., Jouzel, J., Raynaud, D., Barkov, N.I., Barnola, J.-M., Basile, I., Bender, M., Chappellaz, J., Davisk, M., Delaygue, G., Delmotte, M., Kotlyakov, V.M., Legrand, M., Lipenkov, V.Y., Lorius, C., Pepin, L., Ritz, C., Saltzmank, E., Stievenard, M. (1999) Climate and atmospheric history of the past 420,000 years from the Vostok ice core, Antarctica. *Nature* **399**, p. 429-436; Siegenthaler, U., Stocker, T. F., Monnin, E., Luthi, D., Schwander, J., Stauffer, B., et al. (2005). Stable carbon cycle-climate relationship during the late Pleistocene. *Science, 310*(5752), 1313-1317.

- **The Earth's climate has been pretty much the same for millions of years [false]**

  For example, see: Matson, P.A., Dietz, T., Abdalati, W., Busalacchi, Jr., A.J., Caldeira, K., Corell, R.W., DeFries, R.S., Fung, I.Y., Gaines, S., Hornberger, G.M., Lemos, M.C., Moser, S.C., Moss, R.H., Parson, E.A., Ravishankara, A.R., Schmitt, R.W., Turner, II, B.L., Washington, W.M., Weyant, J.P., Whelan, D.A. (2010) Advancing the science of climate change. National Academies Press, Washington, D.C., p. 157; Zachos, J., Pagani, M., Sloan, L., Thomas, E., Billups, K. (2001) Trends, Rhythms, and Aberrations in Global Climate 65 Ma to Present. *Science* **292**(5517) 686-693; IPCC (2007) *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)], p. 449.

- **The Earth's climate is colder now that it has ever been before [false]**

  For example, see: Matson, P.A., Dietz, T., Abdalati, W., Busalacchi, Jr., A.J., Caldeira, K., Corell, R.W., DeFries, R.S., Fung, I.Y., Gaines, S., Hornberger, G.M., Lemos, M.C., Moser, S.C., Moss, R.H., Parson, E.A., Ravishankara, A.R., Schmitt, R.W., Turner, II, B.L., Washington, W.M., Weyant, J.P., Whelan, D.A. (2010) Advancing the science of climate change. National Academies Press, Washington, D.C., p. 157; IPCC (2007) *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)], p. 449.

Q14. The average temperature of the Earth's surface is currently about 58 degrees Fahrenheit. What do you think the average temperature of the Earth's surface was during the last ice age? [Best answer: between 46 and 51 degrees Fahrenheit]

For example, see: NOAA (2009) State of the climate: Global analysis, Annual 2009. http://www.ncdc.noaa.gov/sotc/?report=global&year=2009&month=13; Jansen, E., J. Overpeck, K.R. Briffa, J.-C. Duplessy, F. Joos, V. Masson-Delmotte, D. Olago, B. Otto-Bliesner, W.R. Peltier, S. Rahmstorf, R. Ramesh, D. Raynaud, D. Rind, O. Solomina, R. Villalba and D. Zhang, 2007: Palaeoclimate. In: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, p. 451.

Q15. People disagree about how the climate system works. The five pictures below illustrate five different perspectives. Each picture depicts the Earth's climate system as a ball balanced on a line, yet each one has a different ability to withstand human-caused global warming. Which one of the five pictures best represents your understanding of how the climate system works? *(images randomized)* [Best answer: Threshold]

At different times or spatial scales the climate system can exhibit each of these behaviors, but the best of these five options is probably the Threshold model. For example, see: National Research Council (U.S.). Committee on Abrupt Climate Change. (2002). Abrupt climate change: Inevitable surprises, p. 12.

Q16. Which of the following are "fossil fuels"? *(order of items randomized)* [Correct answers: coal, oil, and natural gas. Incorrect answers: wood, solar energy, and hydrogen.]

For example, see: U.S. Department of Energy (2008) How fossil fuels were formed. http://www.fossil.energy.gov/education/energylessons/coal/gen_howformed.html

Q17. The energy in fossil fuels originally came from: *(order of items randomized)* [Correct answers: photosynthesis by plants over millions of years and the sun. Incorrect answers: the fossilized remains of dinosaurs and uranium in the earth.]

For example, see: U.S. Department of Energy (2008) How fossil fuels were formed. http://www.fossil.energy.gov/education/energylessons/coal/gen_howformed.html

Q18. What gas is produced by the burning of fossil fuels? *(order of items randomized)* [Correct answer: carbon dioxide]

For example, see: Forster, P., V. Ramaswamy, P. Artaxo, T. Berntsen, R. Betts, D.W. Fahey, J. Haywood, J. Lean, D.C. Lowe, G. Myhre, J. Nganga, R. Prinn, G. Raga, M. Schulz and R. Van Dorland, 2007: Changes in Atmospheric Constituents and in Radiative Forcing. *In: Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M.Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, p. 135.

Q19. To the best of your knowledge, roughly how much carbon dioxide was in the atmosphere in the year 1850? [Correct answer: 290 parts per million]

For example, see: Carbon Dioxide Information Analysis Center. Frequently asked global change questions. http://cdiac.ornl.gov/pns/faq.html

Q20. Roughly how much carbon dioxide is in the atmosphere today? [Correct answer: 390 parts per million]

For example, see: Tans, P. (2010) Recent Global CO2. NOAA/ESRL, www.esrl.noaa.gov/gmd/ccgg/trends.

Q21. Which picture best represents your understanding of how the amount of carbon dioxide in the atmosphere has changed over the past 500 years? [Correct answer: an exponential increase]

For example, see: U.S. Global Change Research Program (2009) Global Climate Change Impacts in the United States. p. 14; Forster, P., V. Ramaswamy, P. Artaxo, T. Berntsen, R. Betts, D.W. Fahey, J. Haywood, J. Lean, D.C. Lowe, G. Myhre, J. Nganga, R. Prinn, G. Raga, M. Schulz and R. Van Dorland, 2007: Changes in Atmospheric Constituents and in Radiative Forcing. *In: Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M.Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, p. 135.

Q22a. If we were to stop burning fossil fuels today, the amount of carbon dioxide in the atmosphere would decrease almost immediately. [false]

For example, see: U.S. Global Change Research Program (2009) Global Climate Change Impacts in the United States. p. 15; IPCC, 2007: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)], p. 824-825; Solomon S*,* Plattner G-K*,* Knutti R*,* Friedlingstein P. 2009. *Irreversible climate change due to carbon dioxide emissions. Proc Natl Acad Sci U S A* 106*:* 1704–1709.

Q22b. If we were to stop burning fossil fuels today, global warming would stop almost immediately. [false]

For example, see: IPCC Climate Change 2007: Synthesis Report, p. 46; U.S. Global Change Research Program (2009) Global Climate Change Impacts in the United States. p. 15.

Q23. On average, how long does carbon dioxide stay in the atmosphere once it has been emitted? [Best answers: a hundred years or a thousand years]

For example, see: Archer, D., Eby, M., Brovkin, V., Ridgwell, A., Cao, L., Mikolajewicz, U., et al. (2009). Atmospheric Lifetime of Fossil Fuel Carbon Dioxide. *Annual Review of Earth and Planetary Sciences, 37*, 117-134; IPCC, 2007: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)], p. 824-825; Solomon S*,* Plattner G-K*,* Knutti R*,* Friedlingstein P. 2009. *Irreversible climate change due to carbon dioxide emissions. Proc Natl Acad Sci U S A* 106*:* 1704–1709.

Q24. Which of the following countries emits the largest total amount of carbon dioxide? *(order of items randomized)* [Correct answer: China]

For example, see: Boden, T.A., G. Marland, and R.J. Andres. 2010. Global, Regional, and National Fossil-Fuel CO2 Emissions. Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, U.S. Department of Energy, Oak Ridge, Tenn., U.S.A. doi 10.3334/CDIAC/00001_V2010.

Q25. Which of the following countries emits the most carbon dioxide per person? *(order of items randomized)* [Correct answer: the United States]

For example, see: Boden, T.A., G. Marland, and R.J. Andres. 2010. Global, Regional, and National Fossil-Fuel CO2 Emissions. Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, U.S. Department of Energy, Oak Ridge, Tenn., U.S.A. doi 10.3334/CDIAC/00001_V2010.

Q26. How much does each of the following contribute to global warming? *(order of items randomized)* [Significant contributors to global warming: cars and trucks, burning fossil fuels for heat and electricity, deforestation, cows. Minor or non-contributors to global warming: the hole in the ozone layer, toxic wastes, aerosol spray cans, nuclear power plants[2], volcanic eruptions, the sun, acid rain, the space program]

For example, see: Hegerl, G.C., F. W. Zwiers, P. Braconnot, N.P. Gillett, Y. Luo, J.A. Marengo Orsini, N. Nicholls, J.E. Penner and P.A. Stott, 2007: Understanding and

[2] Although nuclear power generation does not emit carbon dioxide, there are fossil fuel intensive activities associated with the full lifecycle of nuclear power plants, including nuclear power plant construction, operation, the mining and milling of uranium, and power plant decommissioning. For example, see: Sovacool, B.K. (2008). Valuing the greenhouse gas emissions from nuclear power: A critical survey. *Energy Policy, 36,* 2940– 2953.

Attributing Climate Change. In: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 702-703; Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (2007). B. Metz, O.R. Davidson, P.R. Bosch, R. Dave, L.A. Meyer (eds) Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA; Steinfeld, H., Gerber, P. (2006). Livestock's long shadow: environmental issues and options. Rome: Food and Agriculture Organization of the United Nations; Morgan, G. and Smuts, T. (1994) Global warming and climate change: Common misconceptions about climate change. Carnegie Mellon University, Department of Engineering and Public Policy. http://www.gcrio.org/gwcc/misconceptions.html; Lean, Judith L. 2010. Cycles and trends in solar irradiance and climate. *Wiley Interdisciplinary Reviews: Climate Change.* Vol 1, Issue 1. pp 111-122. Dec 22, 2009. doi:10.1002/wcc.018; Kempton, W. (1991). Lay Perspectives on Global Climate Change. *Global Environmental Change-Human and Policy Dimensions, 1,* 183-208; Bostrom, A., Morgan, M. G., Fischhoff, B., & Read, D. (1994). What do People Know About Global Climate-Change. 1. Mental Models. *Risk Analysis, 14,* 959-970; Read, D., Bostrom, A., Morgan, M. G., Fischhoff, B., & Smuts, T. (1994). What do People Know About Global Climate-Change. 2. Survey Studies of Educated Laypeople. *Risk Analysis, 14,* 971-982.

Q27. Of the following, which <u>one</u> do you think <u>contributes most</u> to global warming? [Correct answer: burning fossil fuels for heat and electricity]

For example, see: IPCC, 2007: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)], p. 36.

Q28. The average temperature of the Earth's surface is currently 58 degrees Fahrenheit. What temperature do you think it was 150 years ago? [Correct answer: between 56 to 57 degrees Fahrenheit]

For example, see: U.S. Global Change Research Program (2009) Global Climate Change Impacts in the United States. p. 17; IPCC, 2007: Summary for Policymakers. In: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M.Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, p. 5; Jones, P., New, M. Parker, D., Martin, S., and Rigor I., (1999) Surface air temperature and its changes over the past 150 years. *Reviews of Geophysics*, **37(2)**, 173-199.

Q29. The average temperature of the Earth's surface is currently 58 degrees Fahrenheit. If no additional actions are taken to reduce global warming, what temperature do you think it will be by the year 2020? [Unknown as it depends on future choices and events, but IPCC estimates approximately 58.4º F]

For example, see: IPCC, 2007: Summary for Policymakers. In: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M.Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, p. 12.

Q30. The average temperature of the Earth's surface is currently 58 degrees Fahrenheit. If no additional actions are taken to reduce global warming, what temperature do you think it will be by the year 2050? [Unknown as it depends on future choices and events, but IPCC estimates between 60 and 61º F]

Meehl, G.A., T.F. Stocker, W.D. Collins, P. Friedlingstein, A.T. Gaye, J.M. Gregory, A. Kitoh, R. Knutti, J.M. Murphy, A. Noda, S.C.B. Raper, I.G. Watterson, A.J. Weaver and Z.-C. Zhao, 2007: Global Climate Projections. In: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, p. 749.

Q31. Are each of the following statements definitely true, probably true, probably false, definitely false, or do you not know? ***(order of items randomized)***

- **Global warming will cause some places to get wetter, while others get drier [true]**

  For example, see: Trenberth et al (2007). Observations: Surface and Atmospheric Climate Change. In: *Climate Change 2007: The Physical Science Basis.* Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon et al (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, p. 238.

- **The decade from 2000 to 2009 was warmer than any other decade since 1850 [true]**

  For example, see: Willett et al (2009). State of the Climate in 2009: Global Climate. *Bulletin of the American Meteorological Society*, *91* (7), S19.

- **Scientists can't predict the weather more than a few days in advance – they can't possibly predict the climate of the future [false]**

  For example, see: Hansen et al (2006). Global temperature change. *PNAS, 103,* (39), 14288–14293; Hansen et al (2007). Climate simulations for 1880–2003 with GISS modelE. *Climate Dynamics, 29,* 661-696.

- **Global warming will increase crop yields in some places, and decrease it in others [true]**

  For example, see: Easterling et al (2007) Food, fibre and forest products. *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Eds., Cambridge University Press, Cambridge, UK, p. 275.

- **Scientists' computer models are too unreliable to predict the climate of the future [false]**

  For example, see: Hansen et al (2006). Global temperature change. *PNAS, 103,* (39), 14288–14293; Hansen et al (2007). Climate simulations for 1880–2003 with GISS modelE. *Climate Dynamics, 29,* 661-696.

- **In the 1970s, most scientists were predicting an ice age [false]**

  For example, see: Peterson et al (2008). The Myth Of The 1970s Global Cooling Scientific Consensus. *Bulletin of the American Meteorological Society, 89,* 1325-1337.

- **The Earth's climate has changed naturally in the past, therefore humans are not the cause of global warming [false]**

  For example, see: Forster et al (2007). Changes in Atmospheric Constituents and in Radiative Forcing. *In: Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, p. 135.

- **Global warming will cause temperatures to increase by roughly the same amount in all countries [false]**

  For example, see: Christensen et al (2007). Regional Climate Projections. In: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 850-851.

- **Any recent global warming is caused by the sun [false]**

  For example, see: U.S. Global Change Research Program (2009) Global Climate Change Impacts in the United States. p. 20; Lockwood (2008). Recent changes in solar outputs and the global mean surface temperature. III. Analysis of contributions to global mean air surface temperature rise. *Proceedings of the Royal Society A, 464*, p. 1387.

- **The record snowstorms this winter in the eastern United States prove global warming is not happening [false]**

  For example, see: Masters, J. (2010). Heavy snowfall in a warming world. The Weather Underground, http://www.wunderground.com/blog/JeffMasters/comment.html?entrynum=1427; Ritter, M. (2010) Experts: Cold snap doesn't disprove global warming. Associated Press, January 6, http://abcnews.go.com/Technology/wireStory?id=9495864; Chang, K. (2010) Feeling that cold wind? Here's why. New York Times, January 9, http://www.nytimes.com/2010/01/10/weekinreview/10chang.html; Herring, D., Higgins, W., and Halpert, M. (2010) Can record snowstorms and global warming co-exist? NOAA ClimateWatch Magazine, http://www.climatewatch.noaa.gov/2010/articles/can-record-snowstorms-global-warming-coexist; Hoerling, M., Human, K., and Deluisi, B. (2010) Forensic meteorology solves the mystery of record snows, http://www.climatewatch.noaa.gov/authors/martin-hoerling-katy-human-barb-deluisi-noaa-earth-system-research-laboratory.

- **The Earth is actually cooling, not warming [false]**

  For example, see: Trenberth et al (2007). Observations: Surface and Atmospheric Climate Change. In: *Climate Change 2007: The Physical Science Basis*. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon et al (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, p. 237.

- **Global warming is happening, but will be more beneficial than harmful**

  Ultimately a value judgment. But see: *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change,* Cambridge University Press, Cambridge, UK, 982pp.; Stern, N. H., & Great Britain. Treasury. (2007). *The economics of climate change: the Stern review*. Cambridge, UK; New York: Cambridge University Press.

Q32. Which of the following statements is correct? [Correct answer: Most of the glaciers on Earth are melting away]

For example, see: IPCC, 2007: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)], p. 30; Pritchard, H. D., Arthern, R. J., Vaughan, D. G., & Edwards, L. A. (2009). Extensive dynamic thinning on the margins of the Greenland and Antarctic ice sheets. *Nature, 461*(7266), 971-975; Dyurgerov, M.B. and Meier, M.F. 2000. Twentieth century climate change: Evidence from small glaciers. Proceedings of the National Academy of Sciences 97(4):1406-1411; Williams, R.S., Jr., and Ferrigno, J.G., eds., 2010, Glaciers of Asia: U.S. Geological Survey Professional Paper 1386–F.

Q33. Over the past 100 years, has the speed of glacier melting increased, decreased, or stayed the same? [Correct answer: Increased]

For example, see: IPCC, 2007: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)], p. 109; Pritchard, H. D., Arthern, R. J., Vaughan, D. G., & Edwards, L. A. (2009). Extensive dynamic thinning on the margins of the Greenland and Antarctic ice sheets. *Nature, 461*(7266), 971-975; Rignot, E., & Kanagaratnam, P. (2006). Changes in the velocity structure of the Greenland ice sheet. *Science, 311*(5763), 986-990.

Q34. Which of the following can cause global sea levels to rise?

For the following five items, see: Bindoff, N.L., J. Willebrand, V. Artale, A, Cazenave, J. Gregory, S. Gulev, K. Hanawa, C. Le Quéré, S. Levitus, Y. Nojiri, C.K. Shum, L.D. Talley and A. Unnikrishnan, 2007: Observations: Oceanic Climate Change and Sea Level. In: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, p. 409; National Snow and Ice Data Center (2009). The Contribution of the Cryosphere to Changes in Sea Level. http://nsidc.org/sotc/sea_level.html; Shepherd, A., Wingham, D., Wallis, D., Giles, K., Laxon, S., & Sundal, A. V. (2010). Recent loss of floating ice and the consequent sea level contribution. *Geophysical research letters, 37*.

- **Melting of land ice in Antarctica [true]**
- **Melting of sea ice on the Arctic Ocean [true]**
- **Melting of mountain glaciers [true]**
- **Warmer ocean temperatures [true]**
- **Increased evaporation [false]**

Q35. Of the causes you selected, which one has contributed the most to sea level rise so far? [Best answer among all causes: Warmer ocean temperatures]

For example, see: National Snow and Ice Data Center (2009). The Contribution of the Cryosphere to Changes in Sea Level. http://nsidc.org/sotc/sea_level.html

Q36. How much do scientists estimate that global sea levels rose from 1900 to 2000? [Correct answer: 6-9 inches]

For example, see: .U.S. Global Change Research Program (2009) Global Climate Change Impacts in the United States. p.18; Bindoff, N.L., J. Willebrand, V. Artale, A, Cazenave, J. Gregory, S. Gulev, K. Hanawa, C. Le Quéré, S. Levitus, Y. Nojiri, C.K. Shum, L.D. Talley and A. Unnikrishnan, 2007: Observations: Oceanic Climate Change and Sea Level. In:

Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, p. 409; Church, J.A. & White, N.J. (2006). A 20th century acceleration in global sea-level rise. *Geophysical Research Letters, 33,* L01602 .

Q37. If no additional actions are taken to reduce global warming, how much do you think global sea levels will rise by the year 2100? [Unknown answer, but IPCC 2007 estimated between 8 inches and 2 feet; newer estimates 3 to 4 feet]

For example, see: U.S. Global Change Research Program (2009) Global Climate Change Impacts in the United States. p. 25; Meehl, G. A. *et al.* in *IPCC Climate Change 2007: The Physical Science Basis* (eds Solomon, S. *et al.*) 747–845 (Cambridge Univ. Press, 2007); Rahmstorf, S. A semi-empirical approach to projecting future sea-level rise. *Science* **315**, 368–370 (2007); Pfeffer, W. T., Harper, J. T. & O'Neel, S. Kinematic constraints on glacier contributions to 21st century sea-level rise. *Science* **321**, 1340–1343 (2008).

Q39. Which of the following causes coral bleaching? *(order of items randomized)* [Correct answer: Warmer ocean temperatures]

For example, see: Hoegh-Guldberg O, Mumby PJ, Hooten AJ, Steneck RS and others (2007) Coral reefs under rapid climate change and ocean acidification. Science 318:1737–1742; Douglas AE (2003) Marine Pollution Bulletin 46:385–392.

Q41. Which of the following causes ocean acidification? *(order of items randomized)* [Correct answer: Absorption of carbon dioxide by the ocean]

For example, see: U.S. Global Change Research Program (2009) Global Climate Change Impacts in the United States. p.17; Caldeira, K.; Wickett, M.E. (2003). "Anthropogenic carbon and ocean pH". *Nature* **425** (6956): 365–365. doi:10.1038/425365a; Orr, James C.; *et al.* (2005). "Anthropogenic ocean acidification over the twenty-first century and its impact on calcifying organisms". *Nature* **437** (7059): 681–686. doi:10.1038/nature04095; Hoegh-Guldberg O, Mumby PJ, Hooten AJ, Steneck RS and others (2007) Coral reefs under rapid climate change and ocean acidification.

Q42. How much do you think each of the following actions would reduce global warming if they were done worldwide? *(order of items randomized)*

For the following ten items, for example, see: IPCC, 2007: *Climate Change 2007: Mitigation of Climate Change: Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [B. Metz, O.R. Davidson, P.R. Bosch, R. Dave, L.A. Meyer (eds.)]; America's Climate Choices: National Research Council (2010) Limiting the Magnitude of Future Climate Change, http://books.nap.edu/openbook.php?record_id=12785&page=R1; Stern, N. H., & Great Britain. Treasury. (2007). *The economics of climate change: the Stern review*. Cambridge, UK; New York: Cambridge University Press.

- **Switching from fossil fuels to renewable energy [true]**
- **Planting trees [true]**
- **Reducing tropical deforestation [true]**
- **Switching from gasoline to electric cars [true]**
- **Driving less [true]**
- **Increasing public transportation [true]**
- **Switching from regular to compact fluorescent light bulbs [true]**
- **Insulating buildings [true]**
- **Switching from fossil fuels to nuclear power [true]**
- **Placing a large tax on all fossil fuels [true]**
- **Having at most 2 children per family [true]**

  For example, see: Murtaugh, P.A. & Schlax, M.G. (2009). Reproduction and the carbon legacies of individuals. *Global Environmental Change, 19,* 14-20.

- **Stop eating beef [true]**

  For example, see: Stehfest, E. et al (2009). Climate benefits of changing diet. *Climatic Change, 95,* 83-102; Friel, S. et al (2009). Public health benefits of strategies to reduce greenhouse-gas emissions: food and agriculture. *The Lancet, 374,* 2016-2025.

- **Reducing toxic waste [false]**

  For example, see: Bostrom, A., M.G. Morgan, B. Fischhoff and D. Read (1994). What do people know about global climate change? *Risk Analysis, 14*(6), 959-970.

- **Banning aerosol spray cans [false]**
- **Stop punching holes in the ozone layer with rockets [false]**

  For example, see: Kempton, W. (1991). Lay Perspectives on Global Climate Change. *Global Environmental Change-Human and Policy Dimensions, 1,* 183-208. Bostrom, A., Morgan, M. G., Fischhoff, B., & Read, D. (1994). What do People Know About Global Climate-Change. 1. Mental Models. *Risk Analysis, 14,* 959-970. Read, D., Bostrom, A., Morgan, M. G., Fischhoff, B., & Smuts, T. (1994). What do People Know About Global Climate-Change. 2. Survey Studies of Educated Laypeople. *Risk Analysis, 14,* 971-982.

- **Fertilizing the ocean to make algae grow faster [uncertain]**

  For example, see: Buesseler, K.O (2008). Ocean Iron Fertilization--Moving Forward in a Sea of Uncertainty. *Science, 319,* 162; Boyd, P. W., Jickells, T., Law, C. S., Blain, S., Boyle, E. A., Buesseler, K. O., et al. (2007). Mesoscale iron enrichment experiments 1993-2005: Synthesis and future directions. *Science, 315*(5812), 612-617.

- **Using airplanes to scatter dust high in the atmosphere [uncertain]**

  For example, see: The Royal Society (2009). Geoengineering the climate: Science, governance and uncertainty. Available at: http://royalsociety.org/geoengineering-the-climate/; Crutzen, P. J. (2006). Albedo enhancement by stratospheric sulfur injections: A contribution to resolve a policy dilemma? *Climatic Change, 77*(3-4), 211-219; Robock, A., A. Marquardt, B. Kravitz, and G. Stenchikov (2009), Benefits, risks, and costs of stratospheric geoengineering, *Geophys. Res. Lett.*, *36*, L19703, doi:10.1029/2009GL039209.