



Lesson 20: Estimating a Population Proportion

Student Outcome

- Students use data from a random sample to estimate a population proportion.

Lesson Notes

In this lesson, students continue to work with random samples and the distribution of the sample proportions. The focus in this lesson is to derive the center of the sample proportions (or the mean of the sample proportions). Students begin to see how the distribution clusters around the mean of the distribution. This center is used to estimate the population proportion.

In preparation of this lesson, provide students or small groups of students the random number table and the table of data for all 200 students in the middle school described in the exercises. Students use the random number table to select their random samples in the same way they used the random number table in the previous lesson.

Classwork

Students read the paragraph silently.

In a previous lesson, each student in your class selected a random sample from a population and calculated the sample proportion. It was observed that there was sampling variability in the sample proportions, and as the sample size increased, the variability decreased. In this lesson, you will investigate how sample proportions can be used to estimate population proportions.

Example 1 (19 minutes): Mean of Sample Proportions

This example is similar to the data that students worked with in the previous lesson. The main idea is to have students focus on the center of the distribution of sample proportions as an estimate for the population proportion. For some students, the vocabulary can be problematic. Students are still learning the ideas behind samples and population.

Summarize the problems from the previous lesson by asking the following questions:

- How many samples are needed to calculate the sample proportion?
 - *The sample proportion is the result from one random sample.*
- How is the distribution of the sample proportions formed?
 - *The distribution of the sample proportions is a dot plot of the results from many randomly selected samples.*
- What is the population proportion?
 - *The population proportion is the actual value of the proportion of the population who would respond “yes” to the survey.*

Example 1: Mean of Sample Proportions

A class of 30 seventh graders wanted to estimate the proportion of middle school students who were vegetarians. Each seventh grader took a random sample of 20 middle school students. Students were asked the question, “Are you a vegetarian?” One sample of 20 students had three students who said that they were vegetarians. For this sample, the sample proportion is $\frac{3}{20}$, or 0.15. The following are the proportions of vegetarians the seventh graders found in 30 samples. Each sample was of size 20 students. The proportions are rounded to the nearest hundredth.

0.15	0.10	0.15	0.00	0.10	0.15	0.10	0.10	0.05	0.20
0.25	0.15	0.25	0.25	0.30	0.20	0.10	0.20	0.05	0.10
0.10	0.30	0.15	0.05	0.25	0.15	0.20	0.10	0.20	0.15

Exercises 1–9

Students work in small groups on Exercises 1–9. Then, discuss and confirm as a class.

Exercises 1–9

1. The first student reported a sample proportion of 0.15. Interpret this value in terms of the summary of the problem in the example.

Three of the 20 students surveyed responded that they were vegetarian.

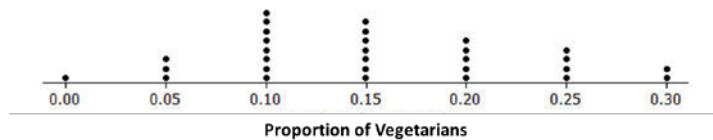
2. Another student reported a sample proportion of 0. Did this student do something wrong when selecting the sample of middle school students?

No. This means that none of the 20 students surveyed said that they were vegetarian.

3. Assume you were part of this seventh-grade class and you got a sample proportion of 0.20 from a random sample of middle school students. Based on this sample proportion, what is your estimate for the proportion of all middle school students who are vegetarians?

My estimate is 0.20.

4. Construct a dot plot of the 30 sample proportions.



5. Describe the shape of the distribution.

Nearly symmetrical or mound shaped centering at approximately 0.15

6. Using the 30 class results listed above, what is your estimate for the proportion of all middle school students who are vegetarians? Explain how you made this estimate.

About 0.15. I chose this value because the sample proportions tend to cluster between 0.10 and 0.15 or 0.10 and 0.20.



7. Calculate the mean of the 30 sample proportions. How close is this value to the estimate you made in Exercise 6?

The mean of the 30 samples to the nearest thousandth is 0.153. The value is close to my estimate of 0.15, and if calculated to the nearest hundredth, they would be the same. (Most likely, students will say between 0.10 and 0.15.)

8. The proportion of all middle school students who are vegetarians is 0.15. This is the actual proportion for the entire population of middle school students used to select the samples. How the mean of the 30 sample proportions compares with the actual population proportion depends on the students' samples.

In this case, the mean of the 30 sample proportions is very close to the actual population proportion.

9. Do the sample proportions in the dot plot tend to cluster around the value of the population proportion? Are any of the sample proportions far away from 0.15? List the proportions that are far away from 0.15.

They cluster around 0.15. The values of 0 and 0.30 are far away from 0.15.

Example 2 (18 minutes): Estimating Population Proportion

This example asks students to work with data from a middle school of 200 students. Although the school is fictitious, the data were obtained from actual middle school students and are representative of middle school students' responses. A list of the entire 200 students' responses is provided at the end of the lesson. The data were collected from the website, <http://www.amst.at.org/censusatschool/>. Details describing the Census at School project are also available on the website of the American Statistical Association, <http://www.amstat.org/>.

In this lesson, students are directed to analyze the last question summarized in the data file of the 200 students at Roosevelt Middle School. If students are more interested in one of the other questions listed, the exercise could be redirected or expanded to include analyzing the data from one of these questions.

Example 2: Estimating Population Proportion

Two hundred middle school students at Roosevelt Middle School responded to several survey questions. A printed copy of the responses the students gave to various questions will be provided by your teacher.

The data are organized in columns and are summarized by the following table:

Column Heading	Description
ID	Numbers from 1 to 200
Travel to School	Method used to get to school: Walk, car, rail, bus, bicycle, skateboard/scooter/rollerblade, boat
Favorite Season	Summer, fall, winter, spring
Allergies	Yes or no
Favorite School Subject	Art, English, languages, social studies, history, geography, music, science, computers, math, PE, other
Favorite Music	Classical, country, heavy metal, jazz, pop, punk rock, rap, reggae, R&B, rock and roll, techno, gospel, other
What superpower would you like?	Invisibility, super strength, telepathy, fly, freeze time

The last column in the data file is based on the question: Which of the following superpowers would you most like to have? The choices were invisibility, super strength, telepathy, fly, or freeze time.

The class wants to determine the proportion of Roosevelt Middle School students who answered "freeze time" to the last question. You will use a sample of the Roosevelt Middle School population to estimate the proportion of the students who answered "freeze time" to the last question.

There are several options for obtaining random samples of 20 responses. It is anticipated that some classes can complete the exercise in the time frame indicated, but it is also likely that other classes require more time, which may require extending this lesson by another class period. One option is to provide each student a printed copy of the data file. A list of the data file in a table format is provided at the end of this lesson. This option requires copying the data file for each student. A second option would be to provide small groups of students a copy of the data file and allow them to work in groups.

MP.6

The standards for this lesson expect students to be involved in obtaining their own samples and using the proportion derived from their samples to estimate the population proportion. By examining the distribution of sample proportions from many random samples, students see that sample proportions tend to cluster around the value of the population proportion. Students attend to precision by carefully describing how they use samples to describe the population.

The number of samples needed to illustrate this is a challenge. The more samples the class can generate, the more clearly the distribution of sample proportions clusters around the value of the population proportion. For this lesson, a workable range would be between 20 and 30 samples.

Discuss how to obtain a random sample of size 20 from the 200 students represented in the data file. The student ID numbers should be used to select a student from the data file. The table of random digits that was used in previous lessons is provided in this lesson. Students drop their pencils on the random table and use the position of one end of the pencil (e.g., the eraser) as the starting point for generating 20 three-digit random numbers from 001 to 200. The ID numbers should be considered as three-digit numbers and used to obtain a random sample of 20 students. Students read three digits in order from their starting point on the table as the student ID (e.g., 0–0–3 is the selection of the student with ID number 3; 0–6–4 is the selection of the student with ID number 64; 1–9–3 is the student with ID number 193). Any ID number formed in this way that is greater than 200 is simply disregarded, and students move on to form the next three-digit number from the random number table. Indicate to students that they move to the top of the table if they reached the last digit in the table. If a number corresponding to a student that has already been selected into the sample appears again, students should ignore that number and move on to form another three-digit number.

After students obtain their 20 ID numbers, they connect the ID numbers to the students in the data file to generate a sample of 20 responses.

Students work with their groups on Example 2. Then, discuss answers as a class.

A random sample of 20 student responses is needed. You are provided the random number table you used in a previous lesson. A printed list of the 200 Roosevelt Middle School students is also provided. In small groups, complete the following exercise:

- Select a random sample of 20 student responses from the data file. Explain how you selected the random sample.

Generate 20 random numbers between 1 and 200. The random number chosen represents the ID number of the student. Go to that ID number row, and record the outcome as “yes” or “no” in the table regarding the freeze time response.

b. In the table below, list the 20 responses for your sample.

Answers will vary. Below is one possible result.

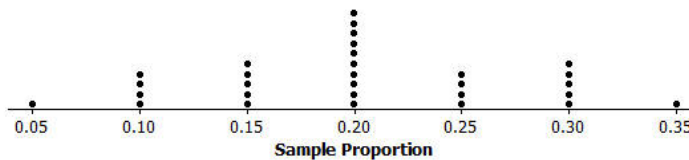
	Response
1	Yes
2	No
3	No
4	No
5	Yes
6	No
7	No
8	No
9	No
10	Yes
11	Yes
12	No
13	No
14	No
15	Yes
16	No
17	No
18	No
19	No
20	No

c. Estimate the population proportion of students who responded “freeze time” by calculating the sample proportion of the 20 sampled students who responded “freeze time” to the question.

Students’ answers will vary. The sample proportion in the given example is $\frac{5}{20}$ or 0.25.

d. Combine your sample proportion with other students’ sample proportions, and create a dot plot of the distribution of the sample proportions of students who responded “freeze time” to the question.

An example is shown below. The class dot plot may differ somewhat from the one below, but the distribution should center at approximately 0.20. (Provide students this distribution of sample proportions if they were unable to obtain a distribution.)



e. By looking at the dot plot, what is the value of the proportion of the 200 Roosevelt Middle School students who responded “freeze time” to the question?

0.20

- f. Usually, you will estimate the proportion of Roosevelt Middle School students using just a single sample proportion. How different was your sample proportion from your estimate based on the dot plot of many samples?

Students' answers will vary depending on their sample proportions. For this example, the sample proportion is 0.25, which is slightly greater than the 0.20.

- g. Circle your sample proportion on the dot plot. How does your sample proportion compare with the mean of all the sample proportions?

The mean of the class distribution will vary from this example. The class distribution should center at approximately 0.20.

- h. Calculate the mean of all of the sample proportions. Locate the mean of the sample proportions in your dot plot; mark this position with an X. How does the mean of the sample proportions compare with your sample proportion?

Answers will vary based on the samples generated by students.

Closing (4 minutes)

To highlight the Lesson Summary, ask students the following questions:

- How is a sample proportion used to estimate a population proportion?
 - *Sample proportions from random samples tend to cluster around the actual value of the population proportion. So, although the sample proportion will not be exactly the same as the population proportion, I can expect it to be close. Therefore, the sample proportion makes a good estimate of the population proportion.*
- What are some different methods that could be used to obtain a random sample?
 - *Answers will vary. Answers could include using the random number table, placing numbers in a bag, or a computer program that randomly chooses numbers.*

Exit Ticket (4 minutes)

Name _____

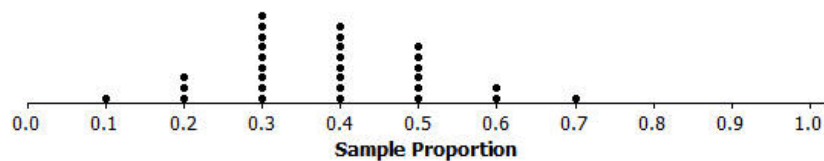
Date _____

Lesson 20: Estimating a Population Proportion

Exit Ticket

Thirty seventh graders each took a random sample of 10 middle school students and asked each student whether or not he likes pop music. Then, they calculated the proportion of students who like pop music for each sample. The dot plot below shows the distribution of the sample proportions.

Dot Plot of Sample Proportions for $n=10$



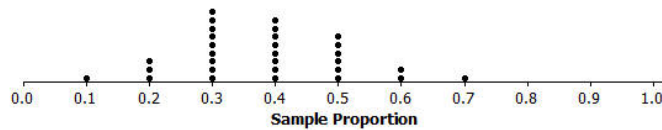
1. There are three dots above 0.2. What does each dot represent in terms of this scenario?

2. Based on the dot plot, do you think the proportion of the middle school students at this school who like pop music is 0.6? Explain why or why not.

Exit Ticket Sample Solutions

Thirty seventh graders each took a random sample of 10 middle school students and asked each student whether or not he likes pop music. Then, they calculated the proportion of students who like pop music for each sample. The dot plot below shows the distribution of the sample proportions.

Dot Plot of Sample Proportions for $n=10$



- There are three dots above 0.2. What does each dot represent in terms of this scenario?

Each dot represents the survey results from one student. 0.2 means two students out of 10 said they like pop music.

- Based on the dot plot, do you think the proportion of the middle school students at this school who like pop music is 0.6? Explain why or why not

No. Based on the dot plot, 0.6 is not a likely proportion. The dots cluster at 0.3 to 0.5, and only a few dots were located at 0.6. An estimate of the proportion of students at this school who like pop music would be within the cluster of 0.3 to 0.5.

Problem Set Sample Solutions

- A class of 30 seventh graders wanted to estimate the proportion of middle school students who played a musical instrument. Each seventh grader took a random sample of 25 middle school students and asked each student whether or not he or she played a musical instrument. The following are the sample proportions the seventh graders found in 30 samples.

0.80	0.64	0.72	0.60	0.60	0.72	0.76	0.68	0.72	0.68
0.72	0.68	0.68	0.76	0.84	0.60	0.80	0.72	0.76	0.80
0.76	0.60	0.80	0.84	0.68	0.68	0.72	0.68	0.64	0.72

- The first student reported a sample proportion of 0.80. What does this value mean in terms of this scenario?

A sample proportion of 0.80 means 20 out of 25 answered yes to the survey.

- Construct a dot plot of the 30 sample proportions.



- c. Describe the shape of the distribution.

Nearly symmetrical. It centers at approximately 0.72.

- d. Describe the variability of the distribution.

The spread of the distribution is from 0.60 to 0.84.

- e. Using the 30 class sample proportions listed on the previous page, what is your estimate for the proportion of all middle school students who played a musical instrument?

The mean of the 30 sample proportions is approximately 0.713.

2. Select another variable or column from the data file that is of interest. Take a random sample of 30 students from the list, and record the response to your variable of interest of each of the 30 students.

- a. Based on your random sample, what is your estimate for the proportion of all middle school students?

Students' answers will vary depending on the column chosen.

- b. If you selected a second random sample of 30, would you get the same sample proportion for the second random sample that you got for the first random sample? Explain why or why not.

No. It is very unlikely that you would get exactly the same result. This is sampling variability—the value of a sample statistic will vary from one sample to another.



Table of Random Digits

Row																				
1	6	6	7	2	8	0	0	8	4	0	0	4	6	0	3	2	2	4	6	8
2	8	0	3	1	1	1	1	2	7	0	1	9	1	2	7	1	3	3	5	3
3	5	3	5	7	3	6	3	1	7	2	5	5	1	4	7	1	6	5	6	5
4	9	1	1	9	2	8	3	0	3	6	7	7	4	7	5	9	8	1	8	3
5	9	0	2	9	9	7	4	6	3	6	6	3	7	4	2	7	0	0	1	9
6	8	1	4	6	4	6	8	2	8	9	5	5	2	9	6	2	5	3	0	3
7	4	1	1	9	7	0	7	2	9	0	9	7	0	4	6	2	3	1	0	9
8	9	9	2	7	1	3	2	9	0	3	9	0	7	5	6	7	1	7	8	7
9	3	4	2	2	9	1	9	0	7	8	1	6	2	5	3	9	0	9	1	0
10	2	7	3	9	5	9	9	3	2	9	3	9	1	9	0	5	5	1	4	2
11	0	2	5	4	0	8	1	7	0	7	1	3	0	4	3	0	6	4	4	4
12	8	6	0	5	4	8	8	2	7	7	0	1	0	1	7	1	3	5	3	4
13	4	2	6	4	5	2	4	2	6	1	7	5	6	6	4	0	8	4	1	2
14	4	4	9	8	7	3	4	3	8	2	9	1	5	3	5	9	8	9	2	9
15	6	4	8	0	0	0	4	2	3	8	1	8	4	0	9	5	0	9	0	4
16	3	2	3	8	4	8	8	6	2	9	1	0	1	9	9	3	0	7	3	5
17	6	6	7	2	8	0	0	8	4	0	0	4	6	0	3	2	2	4	6	8
18	8	0	3	1	1	1	1	2	7	0	1	9	1	2	7	1	3	3	5	3
19	5	3	5	7	3	6	3	1	7	2	5	5	1	4	7	1	6	5	6	5
20	9	1	1	9	2	8	3	0	3	6	7	7	4	7	5	9	8	1	8	3
21	9	0	2	9	9	7	4	6	3	6	6	3	7	4	2	7	0	0	1	9
22	8	1	4	6	4	6	8	2	8	9	5	5	2	9	6	2	5	3	0	3
23	4	1	1	9	7	0	7	2	9	0	9	7	0	4	6	2	3	1	0	9
24	9	9	2	7	1	3	2	9	0	3	9	0	7	5	6	7	1	7	8	7
25	3	4	2	2	9	1	9	0	7	8	1	6	2	5	3	9	0	9	1	0
26	2	7	3	9	5	9	9	3	2	9	3	9	1	9	0	5	5	1	4	2
27	0	2	5	4	0	8	1	7	0	7	1	3	0	4	3	0	6	4	4	4
28	8	6	0	5	4	8	8	2	7	7	0	1	0	1	7	1	3	5	3	4
29	4	2	6	4	5	2	4	2	6	1	7	5	6	6	4	0	8	4	1	2
30	4	4	9	8	7	3	4	3	8	2	9	1	5	3	5	9	8	9	2	9
31	6	4	8	0	0	0	4	2	3	8	1	8	4	0	9	5	0	9	0	4
32	3	2	3	8	4	8	8	6	2	9	1	0	1	9	9	3	0	7	3	5
33	6	6	7	2	8	0	0	8	4	0	0	4	6	0	3	2	2	4	6	8
34	8	0	3	1	1	1	1	2	7	0	1	9	1	2	7	1	3	3	5	3
35	5	3	5	7	3	6	3	1	7	2	5	5	1	4	7	1	6	5	6	5
36	9	1	1	9	2	8	3	0	3	6	7	7	4	7	5	9	8	1	8	3
37	9	0	2	9	9	7	4	6	3	6	6	3	7	4	2	7	0	0	1	9
38	8	1	4	6	4	6	8	2	8	9	5	5	2	9	6	2	5	3	0	3
39	4	1	1	9	7	0	7	2	9	0	9	7	0	4	6	2	3	1	0	9
40	9	9	2	7	1	3	2	9	0	3	9	0	7	5	6	7	1	7	8	7



ID	Travel to School	Favorite Season	Allergies	Favorite School Subject	Favorite Music	Superpower
1	Car	Spring	Yes	English	Pop	Freeze time
2	Car	Summer	Yes	Music	Pop	Telepathy
3	Car	Summer	No	Science	Pop	Fly
4	Walk	Fall	No	Computers and technology	Pop	Invisibility
5	Car	Summer	No	Art	Country	Telepathy
6	Car	Summer	No	Physical education	Rap/Hip-hop	Freeze time
7	Car	Spring	No	Physical education	Pop	Telepathy
8	Car	Winter	No	Art	Other	Fly
9	Car	Summer	No	Physical education	Pop	Fly
10	Car	Spring	No	Mathematics and statistics	Pop	Telepathy
11	Car	Summer	Yes	History	Rap/Hip-hop	Invisibility
12	Car	Spring	No	Art	Rap/Hip-hop	Freeze time
13	Bus	Winter	No	Computers and technology	Rap/Hip-hop	Fly
14	Car	Winter	Yes	Social studies	Rap/Hip-hop	Fly
15	Car	Summer	No	Art	Pop	Freeze time
16	Car	Fall	No	Mathematics and statistics	Pop	Fly
17	Bus	Winter	No	Science	Rap/Hip-hop	Freeze time
18	Car	Spring	Yes	Art	Pop	Telepathy
19	Car	Fall	Yes	Science	Pop	Telepathy
20	Car	Summer	Yes	Physical education	Rap/Hip-hop	Invisibility
21	Car	Spring	Yes	Science	Pop	Invisibility
22	Car	Winter	Yes	Mathematics and statistics	Country	Invisibility
23	Car	Summer	Yes	Art	Pop	Invisibility
24	Bus	Winter	Yes	Other	Pop	Telepathy
25	Bus	Summer	Yes	Science	Other	Fly
26	Car	Summer	No	Science	Pop	Fly
27	Car	Summer	Yes	Music	Pop	Telepathy
28	Car	Summer	No	Physical education	Country	Super strength
29	Car	Fall	Yes	Mathematics and statistics	Country	Telepathy
30	Car	Summer	Yes	Physical education	Rap/Hip-hop	Telepathy
31	Boat	Winter	No	Computers and technology	Gospel	Invisibility
32	Car	Spring	No	Physical education	Pop	Fly
33	Car	Spring	No	Physical education	Pop	Fly
34	Car	Summer	No	Mathematics and statistics	Classical	Fly
35	Car	Fall	Yes	Science	Jazz	Telepathy
36	Car	Spring	No	Science	Rap/Hip-hop	Telepathy
37	Car	Summer	No	Music	Country	Telepathy
38	Bus	Winter	No	Mathematics and statistics	Pop	Fly
39	Car	Spring	No	Art	Classical	Freeze time
40	Car	Winter	Yes	Art	Pop	Fly
41	Walk	Summer	Yes	Physical education	Rap/Hip-hop	Fly
42	Bus	Winter	Yes	Physical education	Gospel	Invisibility



43	Bus	Summer	No	Art	Other	Invisibility
44	Car	Summer	Yes	Computers and technology	Other	Freeze time
45	Car	Fall	Yes	Science	Pop	Fly
46	Car	Summer	Yes	Music	Rap/Hip-hop	Fly
47	Car	Spring	No	Science	Rap/Hip-hop	Invisibility
48	Bus	Spring	No	Music	Pop	Telepathy
49	Car	Summer	Yes	Social studies	Techno/ Electronic	Telepathy
50	Car	Summer	Yes	Physical education	Pop	Telepathy
51	Car	Spring	Yes	Other	Other	Telepathy
52	Car	Summer	No	Art	Pop	Fly
53	Car	Summer	Yes	Other	Pop	Telepathy
54	Car	Summer	Yes	Physical education	Rap/Hip-hop	Invisibility
55	Bus	Summer	Yes	Physical education	Other	Super strength
56	Car	Summer	No	Science	Rap/Hip-hop	Invisibility
57	Car	Winter	No	Languages	Rap/Hip-hop	Super strength
58	Car	Fall	Yes	English	Pop	Fly
59	Car	Winter	No	Science	Pop	Telepathy
60	Car	Summer	No	Art	Pop	Invisibility
61	Car	Summer	Yes	Other	Pop	Freeze time
62	Bus	Spring	No	Science	Pop	Fly
63	Car	Winter	Yes	Mathematics and statistics	Other	Freeze time
64	Car	Summer	No	Social studies	Classical	Fly
65	Car	Winter	Yes	Science	Pop	Telepathy
66	Car	Winter	No	Science	Rock and roll	Fly
67	Car	Summer	No	Mathematics and statistics	Rap/Hip-hop	Super strength
68	Car	Fall	No	Music	Rock and roll	Super strength
69	Car	Spring	No	Other	Other	Invisibility
70	Car	Summer	Yes	Mathematics and statistics	Rap/Hip-hop	Telepathy
71	Car	Winter	No	Art	Other	Fly
72	Car	Spring	Yes	Mathematics and statistics	Pop	Telepathy
73	Car	Winter	Yes	Computers and technology	Techno/ Electronic	Telepathy
74	Walk	Winter	No	Physical education	Techno/ Electronic	Fly
75	Walk	Summer	No	History	Rock and roll	Fly
76	Skateboard/ Scooter/ Rollerblade	Winter	Yes	Computers and technology	Techno/ Electronic	Freeze time
77	Car	Spring	Yes	Science	Other	Telepathy
78	Car	Summer	No	Music	Rap/Hip-hop	Invisibility
79	Car	Summer	No	Social studies	Pop	Invisibility
80	Car	Summer	No	Other	Rap/Hip-hop	Telepathy
81	Walk	Spring	Yes	History	Rap/Hip-hop	Invisibility
82	Car	Summer	No	Art	Pop	Invisibility



83	Walk	Spring	No	Languages	Jazz	Super strength
84	Car	Fall	No	History	Jazz	Invisibility
85	Car	Summer	No	Physical education	Rap/Hip-hop	Freeze time
86	Car	Spring	No	Mathematics and statistics	Pop	Freeze time
87	Bus	Spring	Yes	Art	Pop	Telepathy
88	Car	Winter	No	Mathematics and statistics	Other	Invisibility
89	Car	Summer	Yes	Physical education	Country	Telepathy
90	Bus	Summer	No	Computers and technology	Other	Fly
91	Car	Winter	No	History	Pop	Telepathy
92	Walk	Winter	No	Science	Classical	Telepathy
93	Bicycle	Summer	No	Physical education	Pop	Invisibility
94	Car	Summer	No	English	Pop	Telepathy
95	Car	Summer	Yes	Physical education	Pop	Fly
96	Car	Winter	No	Science	Other	Freeze time
97	Car	Winter	No	Other	Rap/Hip-hop	Super strength
98	Car	Summer	Yes	Physical education	Rap/Hip-hop	Freeze time
99	Car	Spring	No	Music	Classical	Telepathy
100	Car	Spring	Yes	Science	Gospel	Telepathy
101	Car	Summer	Yes	History	Pop	Super strength
102	Car	Winter	Yes	English	Country	Freeze time
103	Car	Spring	No	Computers and technology	Other	Telepathy
104	Car	Winter	No	History	Other	Invisibility
105	Car	Fall	No	Music	Pop	Telepathy
106	Car	Fall	No	Science	Pop	Telepathy
107	Car	Winter	No	Art	Heavy metal	Fly
108	Car	Spring	Yes	Science	Rock and roll	Fly
109	Car	Fall	Yes	Music	Other	Fly
110	Car	Summer	Yes	Social studies	Techno/ Electronic	Telepathy
111	Car	Spring	No	Physical education	Pop	Fly
112	Car	Summer	No	Physical education	Pop	Fly
113	Car	Summer	Yes	Social studies	Pop	Freeze time
114	Car	Summer	Yes	Computers and technology	Gospel	Freeze time
115	Car	Winter	Yes	Other	Rap/Hip-hop	Telepathy
116	Car	Summer	Yes	Science	Country	Telepathy
117	Car	Fall		Music	Country	Fly
118	Walk	Summer	No	History	Pop	Telepathy
119	Car	Spring	Yes	Art	Pop	Freeze time
120	Car	Fall	Yes	Physical education	Rap/Hip-hop	Fly
121	Car	Spring	No	Music	Rock and roll	Telepathy
122	Car	Fall	No	Art	Pop	Invisibility
123	Car	Summer	Yes	Physical education	Rap/Hip-hop	Fly
124	Walk	Summer	No	Computers and technology	Pop	Telepathy
125	Car	Fall	No	Art	Pop	Fly



126	Bicycle	Spring	No	Science	Pop	Invisibility
127	Car	Summer	No	Social studies	Gospel	Fly
128	Bicycle	Winter	No	Social studies	Rap/Hip-hop	Fly
129	Car	Summer	Yes	Mathematics and statistics	Pop	Invisibility
130	Car	Fall	Yes	Mathematics and statistics	Country	Telepathy
131	Car	Winter	Yes	Music	Gospel	Super strength
132	Rail (Train/Tram/ Subway)	Fall	Yes	Art	Other	Fly
133	Walk	Summer	No	Social studies	Pop	Invisibility
134	Car	Summer	Yes	Music	Pop	Freeze time
135	Car	Winter	No	Mathematics and statistics	Pop	Telepathy
136	Car	Fall	Yes	Music	Pop	Telepathy
137	Car	Summer	Yes	Computers and technology	Other	Freeze time
138	Car	Summer	Yes	Physical education	Pop	Telepathy
139	Car	Summer	Yes	Social studies	Other	Telepathy
140	Car	Spring	Yes	Physical education	Other	Freeze time
141	Car	Fall	Yes	Science	Country	Telepathy
142	Car	Spring	Yes	Science	Pop	Invisibility
143	Car	Summer	No	Other	Rap/Hip-hop	Freeze time
144	Car	Summer	No	Other	Other	Fly
145	Car	Summer	No	Languages	Pop	Freeze time
146	Car	Summer	Yes	Physical education	Pop	Telepathy
147	Bus	Winter	No	History	Country	Invisibility
148	Car	Spring	No	Computers and technology	Other	Telepathy
149	Bus	Winter	Yes	Science	Pop	Invisibility
150	Car	Summer	No	Social studies	Rap/Hip-hop	Invisibility
151	Car	Summer	No	Physical education	Pop	Invisibility
152	Car	Summer	Yes	Physical education	Pop	Super strength
153	Car	Summer	No	Mathematics and statistics	Pop	Fly
154	Car	Summer	No	Art	Rap/Hip-hop	Freeze time
155	Car	Winter	Yes	Other	Classical	Freeze time
156	Car	Summer	Yes	Computers and technology	Other	Telepathy
157	Car	Spring	No	Other	Pop	Freeze time
158	Car	Winter	Yes	Music	Country	Fly
159	Car	Winter	No	History	Jazz	Invisibility
160	Car	Spring	Yes	History	Pop	Fly
161	Car	Winter	Yes	Mathematics and statistics	Other	Telepathy
162	Car	Fall	No	Science	Country	Invisibility
163	Car	Winter	No	Science	Other	Fly
164	Car	Summer	No	Science	Pop	Fly
165	Skateboard/ Scooter/ Rollerblade	Spring	Yes	Social studies	Other	Freeze time
166	Car	Winter	Yes	Art	Rap/Hip-hop	Fly



167	Car	Summer	Yes	Other	Pop	Freeze time
168	Car	Summer	No	English	Pop	Telepathy
169	Car	Summer	No	Other	Pop	Invisibility
170	Car	Summer	Yes	Physical education	Techno/ Electronic	Freeze time
171	Car	Summer	No	Art	Pop	Telepathy
172	Car	Summer	No	Physical education	Rap/Hip-hop	Freeze time
173	Car	Winter	Yes	Mathematics and statistics	Other	Invisibility
174	Bus	Summer	Yes	Music	Pop	Freeze time
175	Car	Winter	No	Art	Pop	Fly
176	Car	Fall	No	Science	Rap/Hip-hop	Fly
177	Car	Winter	Yes	Social studies	Pop	Telepathy
178	Car	Fall	No	Art	Other	Fly
179	Bus	Spring	No	Physical education	Country	Fly
180	Car	Winter	No	Music	Other	Telepathy
181	Bus	Summer	No	Computers and technology	Rap/Hip-hop	Freeze time
182	Car	Summer	Yes	Physical education	Rap/Hip-hop	Invisibility
183	Car	Summer	Yes	Music	Other	Telepathy
184	Car	Spring	No	Science	Rap/Hip-hop	Invisibility
185	Rail (Train/Tram/ Subway)	Summer	No	Physical education	Other	Freeze time
186	Car	Summer	Yes	Mathematics and statistics	Rap/Hip-hop	Fly
187	Bus	Winter	Yes	Mathematics and statistics	Other	Super strength
188	Car	Summer	No	Mathematics and statistics	Other	Freeze time
189	Rail (Train/Tram/ Subway)	Fall	Yes	Music	Jazz	Fly
190	Car	Summer	Yes	Science	Pop	Super strength
191	Car	Summer	Yes	Science	Techno/ Electronic	Freeze time
192	Car	Spring	Yes	Physical education	Rap/Hip-hop	Freeze time
193	Car	Summer	Yes	Physical education	Rap/Hip-hop	Freeze time
194	Car	Winter	No	Physical education	Rap/Hip-hop	Telepathy
195	Car	Winter	No	Music	Jazz	Freeze time
196	Walk	Summer	Yes	History	Country	Freeze time
197	Car	Spring	No	History	Rap/Hip-hop	Freeze time
198	Car	Fall	Yes	Other	Pop	Freeze time
199	Car	Spring	Yes	Science	Other	Freeze time
200	Bicycle	Winter	Yes	Other	Rap/Hip-hop	Freeze time