STATISTICS

A STATISTICAL INVESTIGATION

A.1 IDENTIFYING THE STEPS

MCQ 1: The girls' average score in math is 87 (B+), while the boys' average is 75 (C). since $87 > 75$, on average, girls perform better than boys in math.
Which step does this sentence refer to?

- ☐ Step 1: State the Problem
- ☐ Step 2: Collect Data
- ☐ Step 3: Calculate Descriptive Statistics
- ☐ Step 4: Organize and Display Data
- ☐ Step 5: Interpret the Statistics

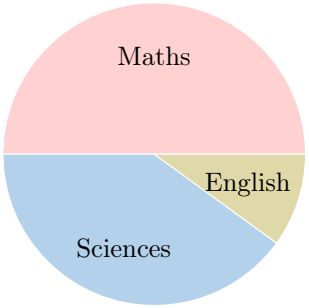
MCQ 2: "Do students prefer science over math?"
Which step does this sentence refer to?

- ☐ Step 1: State the Problem
- ☐ Step 2: Collect Data
- ☐ Step 3: Calculate Descriptive Statistics
- ☐ Step 4: Organize and Display Data
- ☐ Step 5: Interpret the Statistics

MCQ 3: "We asked every student in the school to fill out a survey about their favorite subjects."
Which step does this sentence refer to?

- ☐ Step 1: State the Problem
- ☐ Step 2: Collect Data
- ☐ Step 3: Calculate Descriptive Statistics
- ☐ Step 4: Organize and Display Data
- ☐ Step 5: Interpret the Statistics

MCQ 4: "We made a pie chart showing how many students chose each subject."



Which step does this sentence refer to?

- ☐ Step 1: State the Problem
- ☐ Step 2: Collect Data
- ☐ Step 3: Calculate Descriptive Statistics
- ☐ Step 4: Organize and Display Data
- ☐ Step 5: Interpret the Statistics

MCQ 5: "The relative frequency of students choosing 'Math' as their favorite subject is 50%."
Which step does this sentence refer to?

- ☐ Step 1: State the Problem
- ☐ Step 2: Collect Data
- ☐ Step 3: Calculate Descriptive Statistics
- ☐ Step 4: Organize and Display Data
- ☐ Step 5: Interpret the Statistics

B STATING THE PROBLEM

B.1 FINDING POPULATION

MCQ 6: Imagine you're a statistician studying how much time people spend outdoors. Here's your statistical question:**"How many hours do kids spend playing outside each day?"**
Which group is the best population to study for this question?
Check the correct answer:

- ☐ "All the adults in a city."
- ☐ "All the kids in a school."
- ☐ "Every dog in a neighborhood."
- ☐ "All the teachers in a country."

MCQ 7: Imagine you're a statistician studying pets in homes. Here's your statistical question:**"How many families own a pet in our town?"**
Which group is the best population to study for this question?
Check the correct answer:

- ☐ "All the kids in a playground."
- ☐ "Every bird in a forest."
- ☐ "All the workers in a factory."
- ☐ "All the families in our town."

MCQ 8: Imagine you're a statistician studying reading habits. Here's your statistical question:**"How many books do students borrow from the school library each month?"**
Which group is the best population to study for this question?
Check the correct answer:

- ☐ "All the librarians in a state."
- ☐ "All the students in a school."
- ☐ "Every book in a bookstore."
- ☐ "All the parents in a neighborhood."

MCQ 9: Imagine you're a statistician studying nature. Here's your statistical question:**"How tall are the oak trees in a national park?"**
Which group is the best population to study for this question?
Check the correct answer:

☐ "All the oak trees in a national park."

☐ "All the rivers in a country."

☐ "Every cloud in the sky."

☐ "All the rocks on a mountain."

B.2 SORTING DATA TYPES

MCQ 10: What type of data is this variable: favorite subject (e.g., Maths, Science, English)?

☐ Quantitative variable

☐ Qualitative variable

MCQ 11: What type of data is this variable: number of siblings?

☐ Quantitative variable

☐ Qualitative variable

MCQ 12: What type of data is this variable: type of vehicle (e.g., car, bicycle, bus)?

☐ Quantitative variable

☐ Qualitative variable

MCQ 13: What type of data is this variable: height of students (in cm)?

☐ Quantitative variable

☐ Qualitative variable

MCQ 14: What type of data is this variable: level of education (e.g., high school, bachelor's, master's)?

☐ Quantitative variable

☐ Qualitative variable

MCQ 15: What type of data is this variable: annual income (in dollars)?

☐ Quantitative variable

☐ Qualitative variable

C COLLECTING DATA

C.1 CHOOSING CENSUS OR SURVEY

MCQ 16: You want to find the proportion of girls in a class. Do you use:

☐ Survey

☐ Census

MCQ 17: You want to know how students feel about the new cafeteria menu. Do you use:

☐ Survey

☐ Census

MCQ 18: You need to elect the Grade 7 class representative. Do you use:

☐ Survey

☐ Census

MCQ 19: You want to find out if students across the country have faced physical violence this year. Do you use:

☐ Survey

☐ Census

D DESCRIPTIVE STATISTICS

D.1 SPOTTING STATISTICS

MCQ 20: "Su averages 14.6 points per game."
Is this an example of statistics?

☐ Yes

☐ No

MCQ 21: "John's height is 180 cm."
Is this an example of statistics?

☐ Yes

☐ No

MCQ 22: "The average temperature in July is 25°C."
Is this an example of statistics?

☐ Yes

☐ No

MCQ 23: "Emily's favorite color is blue."
Is this an example of statistics?

☐ Yes

☐ No

MCQ 24: "On average, students in the class scored 85% on the exam."
Is this an example of statistics?

☐ Yes

☐ No

MCQ 25: "The median income in the city is $50,000."
Is this an example of statistics?

☐ Yes

☐ No

E DESCRIPTIVE STATISTICS: RELATIVE FREQUENCY

E.1 CALCULATING RELATIVE FREQUENCIES WITH 2 CATEGORIES

Ex 26: A class of 25 students was surveyed about their gender. Compute the percentages (rounded to one decimal place):

Gender	**Frequency**	**Relative Frequency (%)**
Girls	13	____ %
Boys	12	____ %
Total	25	100%

Ex 27: A class of 25 students took a quiz, and their results were recorded. Compute the percentages (rounded to one decimal place):

Result	**Frequency**	**Relative Frequency (%)**
Pass	15	____ %
Fail	10	____ %
Total	25	100%

Ex 28: A basketball player attempted 50 shots during practice. Compute the shooting percentages (rounded to one decimal place):

Outcome	**Frequency**	**Relative Frequency (%)**
Success	32	____ %
Miss	18	____ %
Total	50	100%

Ex 29: A company tested 70 new light bulbs to see if they would last over 1,000 hours. Compute the success percentages (rounded to one decimal place):

Outcome	**Frequency**	**Relative Frequency (%)**
Success	49	____ %
Miss	21	____ %
Total	70	100%

E.2 CALCULATING RELATIVE FREQUENCIES

Ex 30: In a middle school, students were asked what their favorite animal was. Fill in the relative frequencies (round to 1 decimal place):

Pet	Frequency	Relative Frequency (%)
Cats	18	____ %
Dogs	14	____ %
Hamsters	5	____ %
Fish	3	____ %
Total	40	100%

Ex 31: A group of 50 students chose their favorite fruit. Fill in the relative frequencies (round to 1 decimal place):

Fruit	Frequency	Relative Frequency (%)
Apples	20	____ %
Bananas	15	____ %
Cherries	10	____ %
Grapes	5	____ %
Total	50	100%

Ex 32: In a middle school, students were asked what their favorite means of transportation was. Fill in the relative frequencies (round to 1 decimal place):

Mode of Transportation	Frequency	Relative Frequency (%)
Bus	35	____ %
Bicycle	25	____ %
Walking	15	____ %
Car	5	____ %
Total	80	100%

Ex 33: In a middle school, students were asked what their favorite music genre was. Fill in the relative frequencies (round to 1 decimal place):

Type of Music	Frequency	Relative Frequency (%)
Pop	40	____ %
Rock	30	____ %
Classical	20	____ %
Jazz	10	____ %
Total	100	100%

F DESCRIPTIVE STATISTICS: CENTRAL TENDENCY

F.1 FINDING THE MODE

Ex 34: Look at this frequency table showing marks:

Marks	Frequency
A	10
B	22
C	19
D	15
E	6

What's the mode?

☐ A
☐ B
☐ C mark
☐ D
☐ E

Ex 35: Check this frequency table for modes of transport:

Mode of Transport	Frequency
Bus	18
Bicycle	12
Car	8
Walking	14
Train	6

What's the mode?

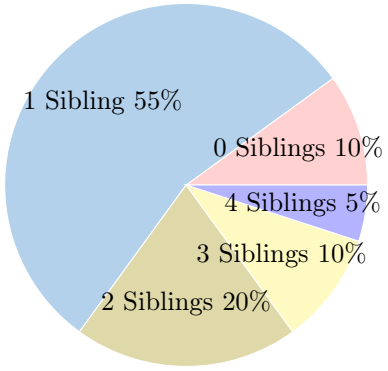
Ex 36: Look at this frequency table showing favorite fruits:

Fruit	Frequency
Apple	14
Banana	20
Orange	12
Grapes	10
Mango	16

What's the mode?

☐ Apple
☐ Banana
☐ Orange fruit
☐ Grapes
☐ Mango

Ex 37: 30 students were asked how many siblings they have, and the results are shown in this pie chart:



What's the mode?

☐ 0 Siblings
☐ 1 Sibling
☐ 2 Siblings
☐ 3 Siblings
☐ 4 Siblings

F.2 CALCULATING A MEAN

Ex 38: Over the last 5 basketball games, I scored these points: 15, 20, 10, 2, and 5.
Find the mean score:

☐ points

Ex 39: Over the last 5 days, I earned these tips as a waiter: 12, 18, 15, 22, and 28.
Find the mean tip:

☐ dollars

Ex 40: Over the last 7 days, I read these numbers of pages: 30, 25, 35, 40, 20, 15, and 45.
Find the mean number of pages:

☐ pages

Ex 41: Over the last 6 days, I spent these amounts on lunch: 8, 12, 10, 15, 9, and 11.
Find the mean cost:

☐ dollars

F.3 CALCULATING A MEDIAN

Ex 42: A café tracked hourly customers:

$$12, 8, 15, 10, 14, 11, 9$$

Calculate the median number of customers.

☐

Ex 43: A fitness group recorded their daily exercise minutes (Monday-Friday):

$$25, 40, 30, 45, 35$$

Find the median exercise time.

☐

Ex 44: Family savings (in $) over 6 months:

$$120, 80, 150, 90, 200, 110$$

Determine the median savings.

☐

Ex 45: A group of students reported the number of books they read in a month as follows:

$$1, 3, 4, 2, 5, 3, 6, 4, 3, 2$$

Determine the median of this dataset.

☐

G DESCRIPTIVE STATISTICS: DISPERSION

G.1 CALCULATING A RANGE

Ex 46: The following data shows the math marks (out of 20) obtained by a group of students:

$$4, 12, 9, 7, 11, 15, 8, 6, 14$$

Find the range of the marks.

☐

Ex 47: The following data shows the average monthly temperatures (in °C) in Montréal over a year:

$$-10, -7, 0, 7, 14, 19, 22, 21, 16, 9, 2, -5$$

Find the **range** of temperatures.

Ex 48: The following data shows the speeds (in km/h) recorded by a radar on a highway during 12 different times of the day:

88.4, 91.0, 95.7, 102.3, 89.6, 100.0, 97.5, 92.1, 94.3, 90.8, 93.2, 96.6

Find the **range** of the speeds.

Ex 49: The following data shows the weights (in kg) of 10 packages stored in a warehouse:

4.2, 3.8, 5.5, 6.1, 4.9, 3.6, 4.4, 5.2, 6.7, 3.9

Find the **range** of the weights.

G.2 CALCULATING A INTERQUARTILE RANGE

Ex 50: The following data shows the marks (out of 20) obtained by 9 students in a math exam:

1, 19, 10, 2, 18, 11, 5, 15, 10

Find the **interquartile range** of the marks.

Ex 51: The following data shows the average monthly temperatures (in °C) in Montréal over a year:

−10, −7, 0, 7, 14, 19, 22, 21, 16, 9, 2, −5

Find the **interquartile range** of the temperatures.

Ex 52: The following data shows the speeds (in km/h) recorded by a radar for 11 cars:

88, 95, 102, 91, 87, 98, 105, 93, 89, 100, 92

Find the **interquartile range** of the speeds.

Ex 53: The following data shows the weights (in kg) of 10 packages stored in a warehouse:

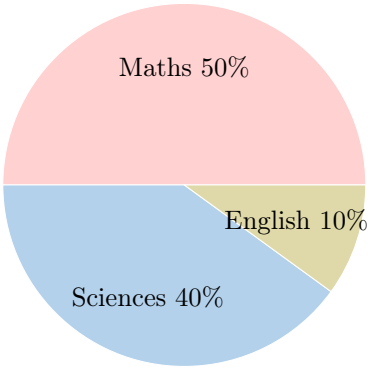
4.2, 3.5, 6.1, 5.0, 4.8, 3.9, 6.7, 5.5, 4.4, 5.2

Find the **interquartile range** of the weights.

H ORGANIZING AND DISPLAYING DATA

H.1 UNDERSTANDING PIE CHARTS AND BAR CHARTS

Ex 54: 30 randomly selected students were asked to name their favorite subject at school. The results of the survey are displayed in the graph.



1. What sort of graph is being used?

   ☐ Bar chart
   ☐ Pie chart

2. Which was the most favoured subject?

   ☐ Sciences
   ☐ Maths
   ☐ English

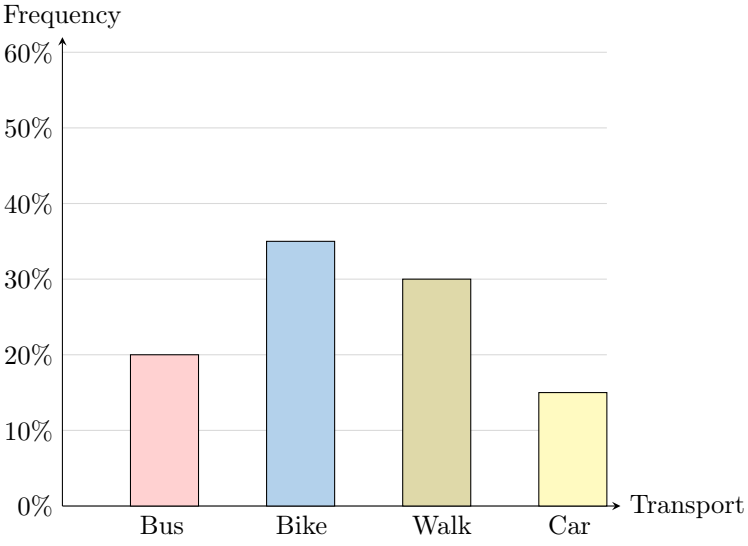
3. What percentage of the students named Sciences as their favorite subject?

   ☐ %

4. What percentage of the students chose either Maths or Sciences as their favorite subject?

   ☐ %

Ex 55: 200 randomly selected students were asked how they travel to school. The results of the survey are displayed in the graph.



1. What sort of graph is being used?

☐ Bar chart
☐ Pie chart

2. Which was the most common mode of transportation?

☐ Bus
☐ Bike
☐ Walk
☐ Car

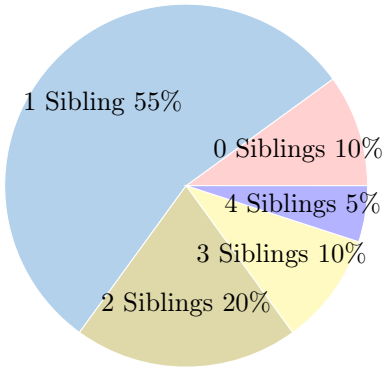
3. What percentage of the students travel to school by bike?

[ ] %

4. What percentage of the students travel to school either by bus or bike?

[ ] %

Ex 56: 30 randomly selected students were asked to state the number of siblings they have. The results of the survey are displayed in the graph.



1. What sort of graph is being used?

☐ Bar chart
☐ Pie chart

2. Which number of siblings is the most common?

☐ 0 Siblings
☐ 1 Sibling
☐ 2 Siblings
☐ 3 Siblings
☐ 4 Siblings

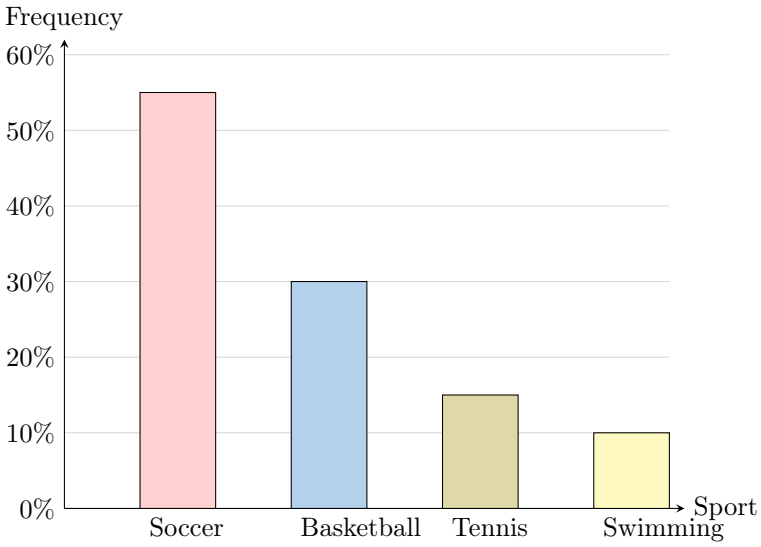
3. What percentage of the students have 2 siblings?

[ ] %

4. What percentage of the students have at least 1 sibling?

[ ] %

Ex 57: 30 randomly selected students were asked to name their favorite sport. The results of the survey are displayed in the graph.



1. What sort of graph is being used?

☐ Bar chart
☐ Pie chart

2. Which was the most favoured sport?

☐ Soccer
☐ Basketball
☐ Tennis
☐ Swimming

3. What percentage of the students named Basketball as their favorite sport?

[ ] %

4. What percentage of the students chose either Soccer or Basketball as their favorite sport?

[ ] %

I INTERPRETING THE STATISTICS

I.1 INTERPRETING RELATIVE FREQUENCY

MCQ 58: Here's a table showing the relative frequency of students' favorite subject:

Subject	Relative Frequency (%)
Maths	46%
Science	44%
English	10%

Check the statements that are true:

☐ Maths is the most popular subject among students.

☐ English is the least popular subject among students.

☐ Maths and Science are almost equally popular among students.

☐ Students get good grades in Maths.

☐ English is the most popular subject among students.

MCQ 59: This table shows the relative frequency of beverage children drink:

Beverage	Relative Frequency (%)
Water	55%
Juice	30%
Soda	10%
Milk	5%

Check the statements that are true:

☐ Water is the most popular beverage among children.

☐ Milk is the least popular beverage among children.

☐ Soda is more popular than Juice.

☐ Milk is the most popular beverage.

☐ Water makes up more than half of all drinks.

☐ Juice and Soda together are less popular than Water alone.

MCQ 60: This table shows how students get to school, based on relative frequency:

Transportation	Relative Frequency (Bus
40%	Walking
30%	Bicycle
20%	Car
10%	

Check the statements that are true:

☐ The Bus is the most popular way to get to school.

☐ The Car is the least popular way to get to school.

☐ Walking and Bicycle are equally popular.

☐ More students walk than take the Bus.

☐ Bicycle and Car together are less popular than the Bus alone.

☐ Walking is the most popular way to get to school.

MCQ 61: Here's a table showing the relative frequency of student's favorite pet:

Pet Type	Relative Frequency (Dogs
50%	Cats
30%	Fish
15%	Birds
5%	

Check the statements that are true:

☐ Dogs are the most popular pets among students.

☐ Birds are the least popular pets among students.

☐ More students own Cats than Fish.

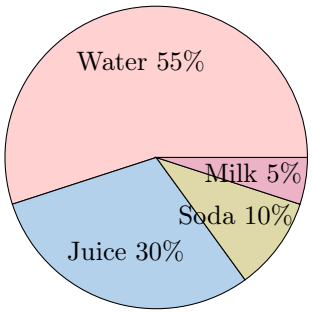
☐ Dogs and Cats together make up more than 75% of all pets.

☐ Birds are more popular than Fish.

☐ Dogs cost more than Cats.

I.2 INTERPRETING RELATIVE FREQUENCY

Ex 62: Here's a pie chart showing what kids drink most often:



Answer these questions based on the pie chart:

1. Which drink do kids choose the most?

   ☐ Water
   ☐ Juice
   ☐ Soda
   ☐ Milk

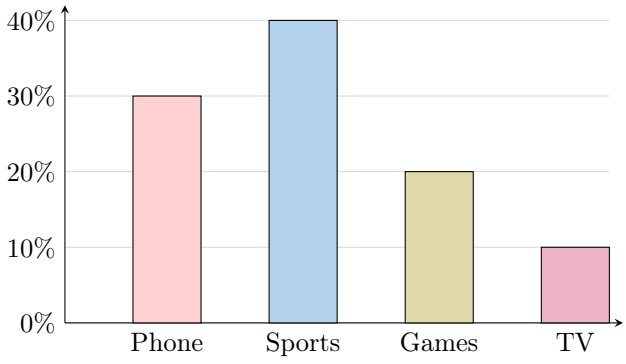
2. Which drink do kids choose the least?

   ☐ Water
   ☐ Juice
   ☐ Soda
   ☐ Milk

3. Do more kids drink soda than juice?

   ☐ Yes
   ☐ No

Ex 63: This bar graph shows how students spend their free time:



Answer these questions based on the bar graph:

1. What's the most popular activity?

   ☐ Phone
   ☐ Sports
   ☐ Games
   ☐ TV

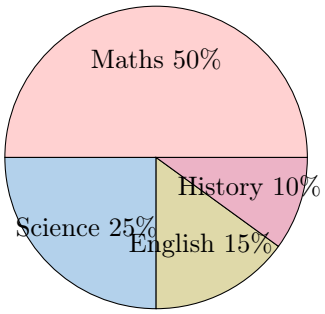
2. What's the least popular activity?

☐ Phone
☐ Sports
☐ Games
☐ TV

3. Do more students play games than use their phones?

☐ Yes
☐ No

Ex 64: This pie chart shows how much time students spend studying different subjects:



Answer these questions based on the pie chart:

1. Which subject gets the most study time?

☐ Maths
☐ Science
☐ English
☐ History

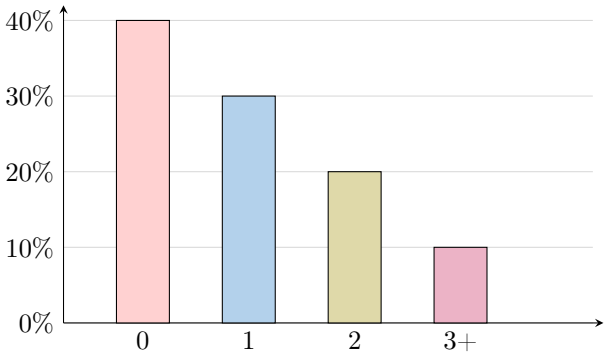
2. Which subject gets the least study time?

☐ Maths
☐ Science
☐ English
☐ History

3. Do students spend more time on English than Science?

☐ Yes
☐ No

Ex 65: This bar graph shows how many siblings students have:



Answer these questions based on the bar graph:

1. What's the most common number of siblings?

☐ 0
☐ 1
☐ 2
☐ 3+

2. What's the least common number of siblings?

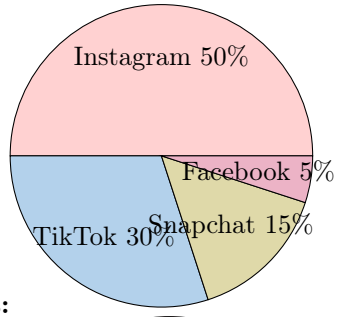
☐ 0
☐ 1
☐ 2
☐ 3+

3. Do more students have 1 sibling than none?

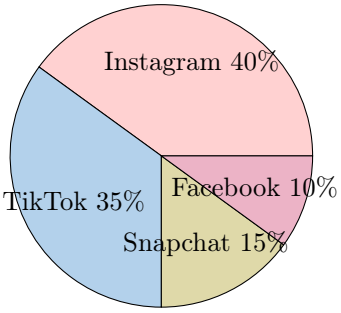
☐ Yes
☐ No

I.3 COMPARING USING PIE CHARTS

MCQ 66: Here are pie charts showing the favorite social media apps for girls and boys:



Girls:

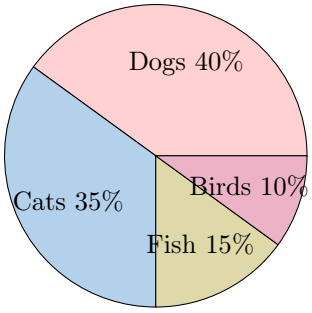


Boys:

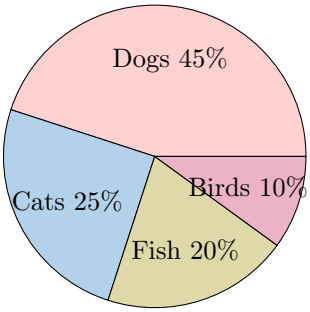
Check the true statements about these favorite apps:

☐ "Instagram is the top app for both girls and boys."
☐ "Boys like Facebook more than girls do."
☐ "Girls like TikTok more than boys do."
☐ "Snapchat is just as popular with girls as with boys."

MCQ 67: Here are pie charts showing the favorite pets for girls and boys:



Girls:

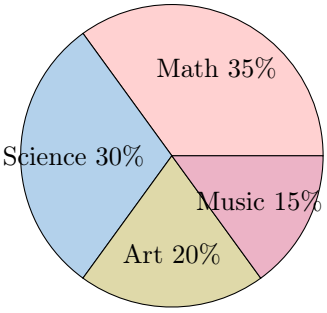


Boys:

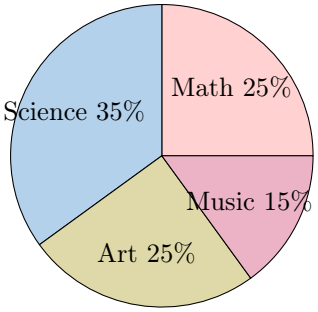
Check the true statements about these favorite pets:

- ☐ "Dogs are the favorite pet for both girls and boys."
- ☐ "Girls like cats more than boys do."
- ☐ "Boys like fish less than girls do."
- ☐ "Birds are equally popular with girls and boys."

MCQ 68: Here are pie charts showing the favorite school subjects in Country A and Country B:



Country A:

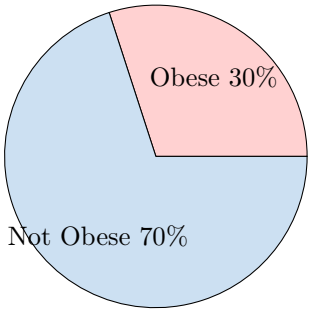


Country B:

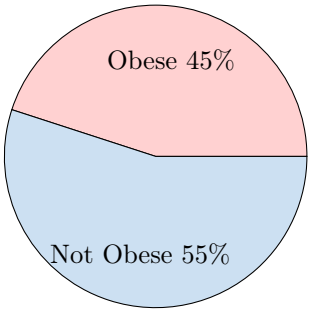
Check the true statements about these favorite subjects:

- ☐ "Country A loves math more than Country B does."
- ☐ "Science is the least favorite subject in Country B."
- ☐ "Art is more popular in Country B than in Country A."
- ☐ "Music has the same fans in both countries."

MCQ 69: Here are pie charts showing the percentage of adults who are obese in Country A and Country B:



Country A:



Country B:

Check the true statements about obesity in these countries:

- ☐ "Country B has a bigger obesity problem than Country A."
- ☐ "More than half of adults in Country A are obese."
- ☐ "Country A has more non-obese adults than Country B."
- ☐ "The obesity rate in Country B is higher than 40%."

I.4 COMPARING USING CENTRAL TENDENCIES

Ex 70: The girls' average score in math is 87 (B+), while the boys' average is 75 (C). Are girls better at math?

Ex 71: The average salary of employees in Company A is \$65,000, while in Company B, it is \$58,000. Does Company A pay higher salaries on average?

Ex 72: The mean summer temperature in City P is 26°C, while in City Q, it is 29°C. Which city is hotter on average?

Ex 73: The mean household income in Neighborhood A is \$82,000, while in Neighborhood B it is \$68,500. Which neighborhood has a higher central tendency in income?

I.5 INTERPRETING CENTRAL TENDENCY

MCQ 74: In a math exam, the median score for a class was 40 out of 100. To pass, students needed at least 50 out of 100.

Check the statements that are true for the teacher:

- ☐ "Oh no! Every student failed the exam."
- ☐ "Oh no! More than half the students failed the exam."
- ☐ "Why didn't we use the CommeUnJeu platform to help them pass?"
- ☐ "The class didn't do very well."

MCQ 75: In a health survey, the median daily sugar intake in a community was 35 grams per person. The recommended maximum is 25 grams per person.

Check the statements that are true for health officials:

- ☐ "We need to act fast! Most people are eating too much sugar."
- ☐ "We should start campaigns to cut down on sugar."
- ☐ "The community's sugar intake is just fine."

MCQ 76: In a community cleanup, the median amount of trash collected by teams was 60 kilograms. The target was at least 50 kilograms per team.

Check the statements that are true for the organizers:

- ☐ "Awesome! Every team beat the target."
- ☐ "Awesome! Most teams reached the target."
- ☐ "Why didn't we give more resources to hit the target?"
- ☐ "The cleanup didn't meet our goals."

MCQ 77: In an economic report, the median yearly salary in a country was \$20,000. The poverty line is set at \$25,000 per year.

Check the statements that are true for policymakers:

- ☐ "This is serious! Most people are below the poverty line."
- ☐ "We need economic changes to help people earn more."
- ☐ "The economy is doing great right now."

I.6 COMPARING CENTRAL TENDENCY AND DISPERSION

MCQ 78: Company A reports an average salary of \$50,000, while Company B reports an average salary of \$55,000. Can we say that the average salary is higher in Company A?

- ☐ Yes
- ☐ No
- ☐ The data are insufficient to answer

MCQ 79: In 2023, the average temperature was 22°C. In 2024, it was 24°C.Can we conclude that temperatures were more variable in 2024?

- ☐ Yes
- ☐ No
- ☐ The data are insufficient to answer

MCQ 80: Store A and Store B both had an average daily sale of \$1500. However, Store A's daily sales ranged from \$1000 to \$2000,while Store B's ranged from \$1400 to \$1600.Were sales more variable in Store A?

- ☐ Yes
- ☐ No
- ☐ The data are insufficient to answer

MCQ 81: In a study, the average height of girls was 160 cm, and the average height of boys was 162 cm.Are girls taller than boys on average?

- ☐ Yes
- ☐ No
- ☐ The data are insufficient to answer

MCQ 82: In Country X, the interquartile range (IQR) of salaries was \$20,000 in 2022and \$25,000 in 2023.Does this indicate greater salary inequality in 2023?

- ☐ Yes
- ☐ No
- ☐ The data are insufficient to answer

I.7 COMPARING CENTRAL TENDENCY AND DISPERSION

Ex 83: In Country X, the interquartile range (IQR) of salaries was \$20,000 in 2022 and \$25,000 in 2023. Does this indicate greater salary inequality in 2023?

Ex 84: In two schools, the average grade on the national math exam was 14 out of 20.However, in School A, the interquartile range (IQR) was 4, while in School B, it was 7.Which school had more variability in students' results?

Ex 85: In City X, the average income in 2023 was \$40,000 with an interquartile range (IQR) of \$10,000.In City Y, the average income was \$45,000, but the IQR was \$18,000.Which city shows more income disparity?

Ex 86: Investment A had an average return of \$5,000 per year, with an interquartile range (IQR) of \$2,000.Investment B had an average return of \$6,000 per year, with an IQR of \$4,000.If we only care about average return, which investment is more attractive?

Ex 87: Investment A had an average return of \$5,000 per year, with an interquartile range (IQR) of \$2,000.Investment B had an average return of \$6,000 per year, with an IQR of \$4,000.If we prefer a safer investment with more predictable returns, which one should we choose?