Marketing Mayhem: Advertising for Adolescents

I. UNIT OVERVIEW & PURPOSE:

Students will obtain knowledge of surveys and their applications and use this knowledge to develop, distribute, and analyze a survey of their own creation about marketing strategies and techniques that impact society.

II. UNIT AUTHOR:

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III. COURSE:

Issues of Equity and Diversity in Mathematics Education

IV. CONTENT STRAND:

Data Analysis and Probability

V. OBJECTIVES:

- The student will design and conduct an experiment/survey. Key concepts include: a) sample size, b) sampling technique, c) controlling sources of bias and experimental error, d) data collection, and e) data analysis and reporting.

VI. MATHEMATICS PERFORMANCE EXPECTATION(s):

MPE.2 – The student will collect and analyze data…
MPE.9 – The student will design and conduct an experiment/survey. Key concepts include: a) sample size; b) sampling technique; c) controlling sources of bias and experimental error; d) data collection; and e) data analysis and reporting.
MPE.22 – The student will analyze graphical displays of univariate data, including dotplots, stemplots, and histograms, to identify and describe patterns and departures from patterns using central tendency, spread, clusters, gaps, and outliers. Appropriate technology will be used to create graphical displays.

VII. CONTENT:

This unit will focus on marketing strategies targeted at influencing particular consumer groups. Given the age of the students, particular interest will be given to teenagers and how items are portrayed to this age group.

VIII. REFERENCE/RESOURCE MATERIALS:

- Computers with Internet access
- Classroom set of TI-83 (or higher) Graphing Calculators

IX. PRIMARY ASSESSMENT STRATEGIES:

Assessment 1: Journal Reflections and Questions (3 entries, 10 points each)
Assessment 2: Classroom discussion, participation (10 points)
Assessment 3: Presentation of Analyzed Data (60 points)

X. EVALUATION CRITERIA:

Presentation (see attached rubric)

XI. INSTRUCTIONAL TIME:

Each lesson will occur in 90 minute blocks for 5 – 7 days. To account for the amount of time it may take to obtain responses to the surveys, extra days are supplied. During these extra days, further exploration of the related SOLs will be completed.

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in collaboration with
Mr. Michael Bolling, Virginia Department of Education

Shopper Surveys: Managing the Market

Strand
Data Analysis and Probability

Mathematical Objective(s)
In this lesson, the student will examine previously conducted surveys and the processes used to analyze the results from the given surveys. Students will discuss the sample size and sampling techniques used to conduct each survey. Students will research graphical representations used to display results of surveys.

Mathematics Performance Expectation(s)

MPE.9 – The student will design and conduct an experiment/survey. Key concepts include: a) sample size; b) sampling technique; c) controlling sources of bias and experimental error; d) data collection; and e) data analysis and reporting.

Related SOL

AFDA.3 (Collect and represent data)

AFDA.8 (Design and conduct experiment/survey)

NCTM Standards List all applicable NCTM standards related to each lesson. Example:

- Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them.
- Select and use appropriate statistical methods to analyze data.
- Develop and evaluate inferences and predictions that are based on data.
- Communicate their mathematical thinking coherently and clearly to peers, teachers, and others.
- Create and use representations to organize, record, and communicate mathematical ideas.

Materials/Resources

- Classroom set of graphing calculators
- Internet access
- View the following videos:
    - Teaching English, Creating Survey Questions: http://www.youtube.com/watch?v=dfct9PET6lY
    - 5 Questions to ask for Survey Success: http://www.youtube.com/watch?v=3mrt15qOZ0Q

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- Article Review:
  http://www.thenationalcampaign.org/sextech/pdf/sextech_summary.pdf

Assumption of Prior Knowledge

- Students should have completed Algebra 1.
- Students should have a prior mathematics knowledge regarding basic experiment/survey set up and techniques (this will be accomplished in the form of class discussion.) Touching on: the purposes of surveys, sample size, and sampling techniques.
- Students should have an analytical understanding of experimental design.
- Students will develop language to better communicate their experimental design.
- Students may find it difficult to develop a meaningful survey independently.
- Students should have seen and read outcomes of surveys.
- Students should have experience using the Internet as a research tool.
- This lesson builds on the students' basic knowledge of experimental design and challenges students to develop their own background knowledge and critical thinking.

Introduction: Setting Up the Mathematical Task

- In this lesson, the student will examine results of previously conducted surveys and the implications based upon these results. The student will also explore the processes involved in analyzing and depicting the results of each survey.

- Class Overview: Introduce prior knowledge (20 minutes), Examine previously conducted surveys (30 – 45 minutes), Research sample size, sampling techniques, and graphical displays of data (30 minutes), Summary and discussion (10 minutes).

Student Exploration 1:

Students will begin the class by exploring how surveys are used to navigate the direction that the marketing world takes in presenting products to consumers. Students will then discuss the impact of sample size and sampling techniques on the results of each survey. In addition, the students will explore and discuss various methods used to display results of surveys. As a result of this discussion, the students should illustrate an understanding of the explored concepts.

Student/Teacher Actions:

- The students will use this class period to develop their knowledge of surveys and how the purpose of each is demonstrated through the types of questions displayed on the survey. Students will also examine the usage of various reporting methods in the form of graphical representations and their influence upon the consumers.
- The teacher should ask questions to guide student examination of the given surveys and to lead students to research multiple methods of displaying data.

Monitoring Student Responses

- students will display their understanding and retention of the topics via classroom discussion
- teacher and/or students will discuss concepts influencing marketing strategies to promote products to target groups
- teacher will simplify questioning for students who have difficulties comprehending the topics being examined; and
- teacher will ask students to develop a list of possible survey topics that reflect their personal lives.

- Summary
    - The last 10 minutes of the class will be spent as a whole group discussion to summarize the information and prepare for the beginning of the next lesson.
    - Students will submit a list of the possible survey topics that they are interested in pursuing.

Assessment

- **Students should be capable of:**
    - Explaining the impact of surveys in marketing research
    - Identifying key components of a survey and its quality (good or bad)
    - Exploring techniques of performing a survey and determining which techniques are appropriate to use in each situation.
    - **Questions (to occur during class discussion)** (5 points)
        - Why does the marketing world rely so heavily upon the results of consumer surveys?
        - How do these results shape the direction our market takes?
        - If you were a business owner, how much consideration would you place on survey results?
    - **Journal/writing prompts** (5 points)
        - Create a list of potential survey topics that reflect interests that you have.

- **Other**
  - Student understanding will be observed during the whole group discussion of the influence of surveys.

Extensions and Connections (for all students)

- Students will formulate a list of survey topics that reflect their individual interests.
- This lesson will incorporate the skills of interpreting survey results and understanding marketing aspects and trends in the market.
- Business and Economics teachers would be great assets for these students to obtain further information regarding the inner workings of our marketing system.

Strategies for Differentiation

- List ideas for addressing needs of a diverse population of students such as:
  - Kinesthetic (students will be allowed to visit different stations illustrating the variety of types of surveys), auditory (watch/listen to videos demonstrating survey development and analysis), or visual learners (visual presentations of surveys);
  - Kids with processing, memory, motor issues (use of computers);
  - English language learners (ELLs) (surveying examples will be presented to these students in their first language);
  - High-ability students (These students will be encouraged to do further research on topics that interest them).
- Students will be presented with multiple examples of types of surveys that explore multiple research topics. These examples will provide the students with a variety of surveying outlines.
- Students may need to be guided in appropriate directions to assist them in developing the necessary understanding desired as a result of this lesson.

Strand
Data Analysis and Probability

Mathematical Objective(s)
In this lesson, the student will construct a list of media references that appeal to their age group. Students will use their prior knowledge to categorize the media topics (music, appearance, food, personal interests, etc.) discussed and analyze the variety of ways these topics are portrayed by society. Students will design and conduct a survey based upon their input on media topics and the media's impact on their age group. Students will report their findings through a variety of graphical representations.

Mathematics Performance Expectation(s)

> **MPE.9** – The student will design and conduct an experiment/survey. Key concepts include: a) sample size; b) sampling technique; c) controlling sources of bias and experimental error; d) data collection; and e) data analysis and reporting.

Related SOL

AFDA.3 (Collect and represent data)

AFDA.8 (Design and conduct experiment/survey)

NCTM Standards

- Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them.
- Select and use appropriate statistical methods to analyze data.
- Develop and evaluate inferences and predictions that are based on data.
- Communicate their mathematical thinking coherently and clearly to peers, teachers, and others.
- Create and use representations to organize, record, and communicate mathematical ideas.

Materials/Resources

- Classroom set of graphing calculators
- Microsoft Word access
- Internet access
    - http://www.surveygizmo.com/survey-examples/consumer-surveys/
    - http://www.surveymonkey.com/mp/survey-templates/

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    - http://www.surveyexamples.org/
    - http://www.statpac.com/online-surveys/onlinesurveysample.htm
    - http://www.google.com/insights/consumersurveys/examples
    - http://www.snapsurveys.com/samplesurveys/us/
- The following websites are for teacher use, review of calculator usage:
    - http://www.youtube.com/watch?v=Kdu2W_jjLZ8
    - http://www.youtube.com/watch?v=1nYVGhd9K2Q

Assumption of Prior Knowledge

- Students should have completed Algebra 1.
- Students should have a prior mathematics knowledge regarding basic experiment/survey set up and techniques (this will be accomplished in the form of class discussion.) Touching on: the purposes of surveys, sample size, and sampling techniques.
- Students should have an analytical understanding of experimental design.
- Students will develop language to better communicate their experimental design.
- Students may find it difficult to develop a meaningful survey independently.
- Students should have seen and read outcomes of surveys.
- Students should have experience using the Internet as a research tool.
- This lesson builds on the students; basic knowledge of experimental design and challenges students to develop their own background knowledge and critical thinking.
- The social concept of media's influence to certain age groups.

Introduction: Setting Up the Mathematical Task

- All students are influenced in some way by the representation of objects by the media. In this lesson, the student will investigate the media and its influence on their personal lives and the lives of their peers. The student will discuss topics including: music, apparel, food, games, sports, etc. The student will organize the discussed topics in appropriate categories. The student will then apply this discussion to formulate questions applicable to their own survey of the personal interests of their age group.
- The students will be introduced (or reintroduced) to a variety of methods used in displaying data results. These will include histograms, circle graphs, line graphs, scatter plots, and box-and-whisker plots. Other displays can be discussed at the teacher's discretion. The integration of the graphing calculator will be used in the assistance of creating many of these multiple graphical displays.
- Class Overview: Introduce prior knowledge (10 minutes), Research (25 minutes), Create list of survey questions (15 minutes), Design the survey (20 minutes), Discuss graphical displays (25 minutes), Summarize/Reflect (10 minutes)

Student Exploration 1:

Students will recall the information from the previous lesson concerning surveys, their uses, and their design. Students will then brainstorm on concepts reflecting the media and its influence on their age group. Students will condense the topics into simplified categories and compose surveys with questions reflecting the types of media influences that have been discussed.

Student/Teacher Actions:

- The students will reflect upon the influence that media has on their individual lives and the lives of their peers. Based upon this reflection, the students will begin a classroom discussion concerning the impact of media in their lives and will develop questions for a survey of their own relating to these topics.
- The teacher should monitor the group conversation to ensure that the students stay on topic, providing leading questions when necessary to assist students to proceed in the appropriate direction.

Monitoring Student Responses:

- students will illustrate their understanding of the topic being discussed by producing related topics to be researched
- teacher and/or students will discuss concepts of the media's role in our society
- teacher will simplify questioning for students who have difficulties comprehending the topics being examined; and
- teacher will ask students to select a survey topic based upon the multiple topics discussed throughout the class period

- Summary
    - The last 10 minutes of the class will be summarizing the process of creating an appropriate survey and the techniques used to ensure control for bias and error. The students will recall how the development of questions can impact the response of the individuals being surveyed. The students will also be reminded of the multiple methods of presenting their results in a variety of graphs.
    - Students will submit their survey reflecting their choice in topic and the necessary questioning needed to obtain appropriate results.

Assessment

- **Students should be capable of:**
    - Identifying key components of a survey and its quality (good or bad).

    - Constructing of survey pertaining to the topic being examined.
    - Controlling for bias/error.
    - Creating appropriate graphs for displaying survey results.
  - **Questions** (5 points)
    - How evident is the media's impact on the daily lives of individuals?
    - Does the influence of the media have a greater response depending upon the age of the individual?
    - What other influences may sway the survey results?
    - How can you control for bias and error in your survey?
  - **Journal/writing prompts** (5 points)
    - Formulate a prediction of how you feel individuals will respond to your survey.
  - **Other**
- The teacher will gather information regarding student understanding by discussing with and questioning each student during the formulation process of their survey. The teacher may provide leading questions to the students to allow the students to begin further exploration of their topics.
- Worksheet – Gizmo's Graphs (Homework)

- See attached rubric for grading scale of survey design and features.

Extensions and Connections (for all students)

- Students will create and distribute surveys that reflect the topic that they have chosen to research.
- This lesson will require the students to use the skills that they have obtained regarding important surveying techniques to employ in their own surveys.
- The students will connect to their peers and the faculty members of the school by having these individuals complete their surveys.

Strategies for Differentiation

- List ideas for addressing needs of a diverse population of students such as:
  - Kinesthetic (students will be allowed to visit the library to access further resources), auditory (explore/listen to videos related to research upon their selected topics), or visual learners (prints outs of various types of surveys will be distributed for student references);
  - Kids with processing, memory, motor issues (use of computers);
  - English language learners (ELLs) (surveys can be presented in students' original language and then translated);
  - High-ability students (These students will be encouraged to explore topics that may require deeper analysis).

- Students will continue to reference their survey examples for guides in developing their own survey.
- Students will be given critiques to the quality of their questioning and allowed to adjust their surveys.

Reporting Results

Strand
Data Analysis and Probability

Mathematical Objective(s)
Each student will create a presentation to report their findings. In the presentation, the student should adequately illustrate appropriate understanding of the concepts discussed throughout the lesson.

Mathematics Performance Expectation(s)

> **MPE.9** – The student will design and conduct an experiment/survey. Key concepts include: a) sample size; b) sampling technique; c) controlling sources of bias and experimental error; d) data collection; and e) data analysis and reporting.

Related SOL

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NCTM Standards

- Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them.
- Select and use appropriate statistical methods to analyze data.
- Develop and evaluate inferences and predictions that are based on data.
- Communicate their mathematical thinking coherently and clearly to peers, teachers, and others.
- Create and use representations to organize, record, and communicate mathematical ideas.

Materials/Resources

- Classroom set of graphing calculators
- Microsoft Word access
- Internet access

Assumption of Prior Knowledge

- Students should have completed Algebra 1.

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- Students should have a prior mathematics knowledge regarding basic experiment/survey set up and techniques (this will be accomplished in the form of class discussion.) Touching on: the purposes of surveys, sample size, and sampling techniques.
- Students should have an analytical understanding of experimental design.
- Students will develop language to better communicate their experimental design.
- Students may find it difficult to develop a meaningful survey independently.
- Students should have seen and read outcomes of surveys.
- Students should have experience using the Internet as a research tool.
- This lesson builds on the students' basic knowledge of experimental design and challenges students to develop their own background knowledge and critical thinking.
- The social concept of media's influence to certain age groups.

Introduction: Setting Up the Mathematical Task

- The students should have a necessary understanding of comprehending and reporting surveys by this point. The students will apply this knowledge to create a presentation (report, graphs/diagrams/charts, etc.) to relay their survey results to the class as a whole.

- Class Overview: Review methods of presenting results (10 minutes), Explore Grading Rubric (15 minutes), Summarizing Results (30 minutes), Formulating/Finalizing Presentation (30 minutes), Final Questions (5 minutes)

Student Exploration 1:

Students will illustrate their understanding of the surveying processes explored throughout the unit by formulating a presentation to report the results of their individual surveys. Various methods of relaying the results of surveys will be reviewed for student usage in their own presentations. In their presentations, the students will meet certain skills (see attached rubric) to show an adequate retention of the material covered throughout the lesson.

Student/Teacher Actions:

- The students will create an adequate presentation to relay their analysis of their individual surveys. This presentation will reflect understanding of analyzing surveys and interpreting their results. Students will be graded based upon the supplied rubric.
- The teacher will examine each presentation based upon the requirements stated in the rubric. Students with disabilities will be provided with questioning to further explore their understanding that is not conveyed within their presentation.

Monitoring Student Responses

- students will illustrate an overall understanding of the unit through their individual presentations
- students will adequately answer questioning from their peers and their instructor about their research
- teacher will provide students with additional feedback regarding their topic of exploration

- Summary
    - Questioning during student presentations will assist in summarizing student research.
    - During the last 5 minutes of class, the teacher will present the students with any remaining questions/concerns regarding their research and result reporting.

Assessment

- **Students should be capable of:**
    - Adequately presenting the results of their surveys in an appropriate manner
    - Demonstrating an adequate understanding of the techniques and methods employed to achieve the results of the survey
    - **Questions** (5 points)
        - How did your survey results surprise you/meet your expectations?
        - How did the age of your responders affect your results?
        - Did bias or error have an effect on your survey results?
    - **Journal/writing prompts** (5 points)
        - What could you do to change your survey to improve the results and better control for bias and error?
        - Make these changes to your survey and resubmit the improved version.
    - **Other**
        - The student will be evaluated based upon their presentation and how it fits into each requirement on the rubric. Students with disabilities will be provided with questioning to elaborate on any missing aspects of their presentations to meet the requirements of the rubric.
- See attached rubric.

Extensions and Connections (for all students)

- Students will be allowed to extend their research by surveying other groups at their discretion provided previous approval.
- Students will be encouraged to further explore their interests in the topic.

Strategies for Differentiation

- List ideas for addressing needs of a diverse population of students such as:
    - Kinesthetic (students will be allowed to move around during their presentation), auditory (students can incorporate approved videos/recordings in their presentation), or visual learners (students can incorporate a variety of graphs and displays into their presentation);
    - Kids with processing, memory, motor issues (needed teacher assistance and use of computers in composing presentation);
    - English language learners (ELLs) (assistance in translating during student presentation);
    - High-ability students (teacher questioning leading to more in-depth thinking about results).
- Students will be allowed to construct their presentation in a variety of methods.
- Teacher questioning will engage students in exploring the meaning behind their results.

Rubric for Survey Research/Design and Presentation

Total Points Possible: 60

Category	Poor (0 points)	Fair/Good (5 points)	Excellent (10 points)
Survey Research/Design			
Exploration/Research of survey techniques/design	The student has no understanding of the technique and research process involved in the conduction of an experiment/survey	The student has minimal understanding of the technique and research process involved in the conduction of an experiment/survey.	The student shows complete understanding of the technique and research process involved in the conduction of an experiment/survey
Survey design/features	The student has no understanding of how to design a survey with meaningful questions, effective sampling techniques, while addressing the original question	The student has minimal understanding of how to design a survey with meaningful questions, effective sampling techniques, while addressing the original question	The student excels in understanding how to design a survey with meaningful questions, effective sampling techniques, while addressing the original question
Control for Bias and Error	The student did not control the bias issue or address and report any error	The student did little to control the bias issue or address and report any error	The student controlled the bias issue, addressed and reported any error
Presentation			
Explanation of Survey	The student did not explain the survey in detail at all and had no understanding of the task	The student explained the survey in small details and had some understanding of the task	The student explained the survey in detail and had a clear understanding of the task
Clarity, quality, creativity (poster, powerpoint presentation, game, etc.)	The student did not create a unique presentation to demonstrate learning of surveys	The student showed little creativity when designing a presentation to report results on survey	The student presented the results of survey in a creative manner
Organization	The student did not have presentation in organized manner	The student showed minimal organizational skill	The student showed organization skills effectively
Comments			
Total Points			

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Gizmo's Graphs

Gizmo is an assistant to Dr. Jones, a researcher in the movie producing world. Dr. Jones has asked Gizmo to develop a variety of graphs to display to a group of movie producers interested in discovering which movie genre most individuals want to view. Other issues that concern the group include the impact of age and gender on how individuals make their decisions regarding movies. Gizmo is running out of time and needs your help to create his graphs. Use the techniques discussed in class to help Gizmo.

1. Gizmo's first results related each responder's age to the number of movies that they owned. He wanted to create a scatter plot to illustrate if a correlation existed between age and the number of movies owned.

   14 year olds – 5, 7, 12, 8 16 year olds – 13, 16, 12, 18 18 year olds – 24, 16, 20, 21

   20 year olds – 27, 29, 34, 33 22 year olds – 37, 32, 36, 34 24 year olds – 40, 38, 41, 37

2. Gizmo next wanted to create a double bar graph to illustrate how gender affects the genre each of the individuals marked as their three favorite genres. The following are their results.

   Comedy: Males – 27, Females – 18 Action: Males – 41, Females – 23

   Romance: Males – 8, Females – 33 Horror: Males – 32, Females – 14

3. Gizmo wants to display the following results in a box-and-whisker plot. These results show the various ages of moviegoers. These will help determine the age group of most moviegoers.

   Moviegoers Ages: 15, 12, 28, 34, 35, 52, 21, 18, 22, 24, 9, 65, 87, 21, 15, 16, 34, 38, 62, 42, 47, 51, 33, 24, 20, 10, 14, 17, 33, 38, 41, 53, 22, 18, 11

4. For Gizmo's final graph, he wants to display the interrelationship of age and gender on the how often individuals went to the movie theaters. Help him create circle graphs display age and genders influence.

	12 – 15	16 – 19	20 – 23	23+
Once A Year:	M – 3, F – 1	M – 0, F – 2	M – 1, F – 1	M – 2, F – 2
Once A Month:	M – 11, F – 8	M – 14, F – 17	M – 20, F – 15	M – 18, F – 16
Once A Week:	M – 14, F – 12	M – 24, F – 29	M – 27, F – 33	M – 28, F – 42
Multiple Times A Week:	M – 8, F – 9	M – 16, F – 18	M – 19, F – 21	M – 17, F – 20

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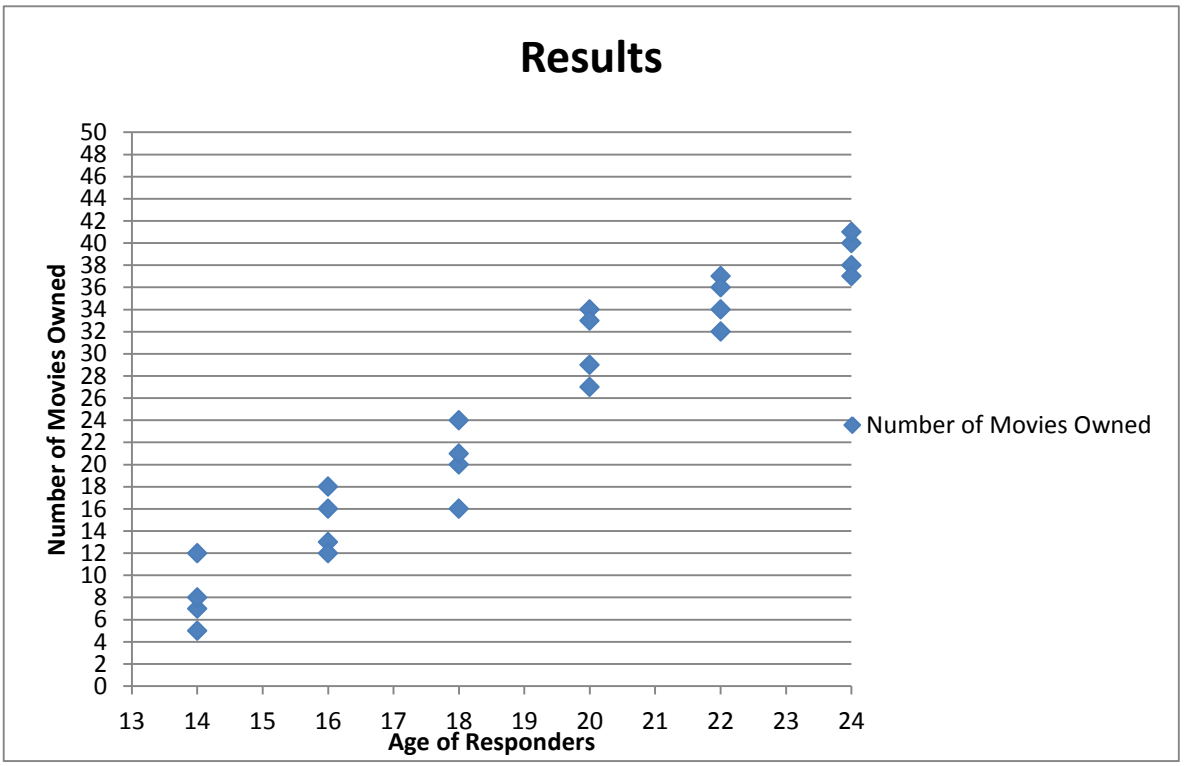
Gizmo's Graphs (Answer Key)

1.



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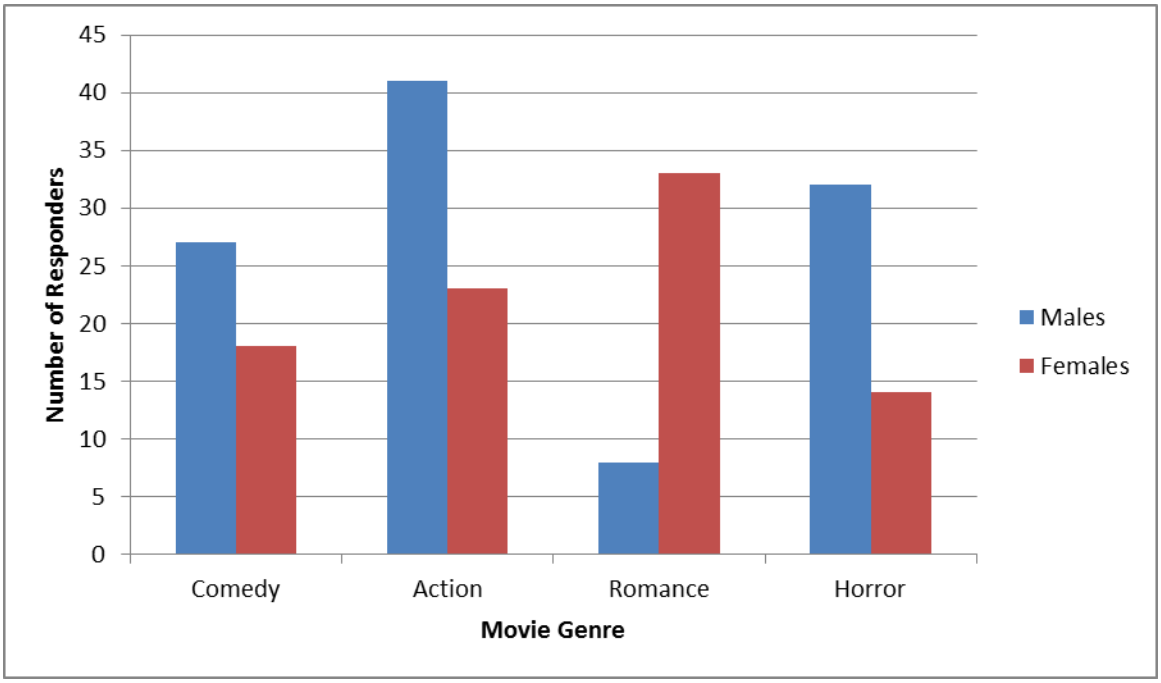
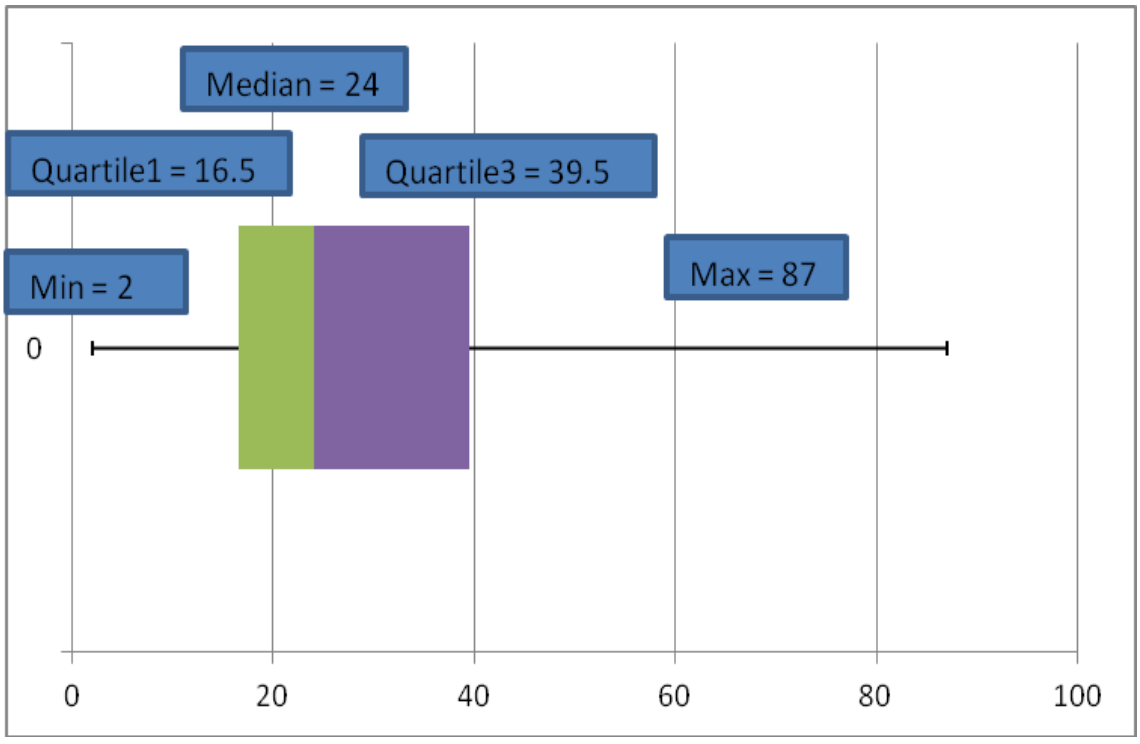
2.



3.



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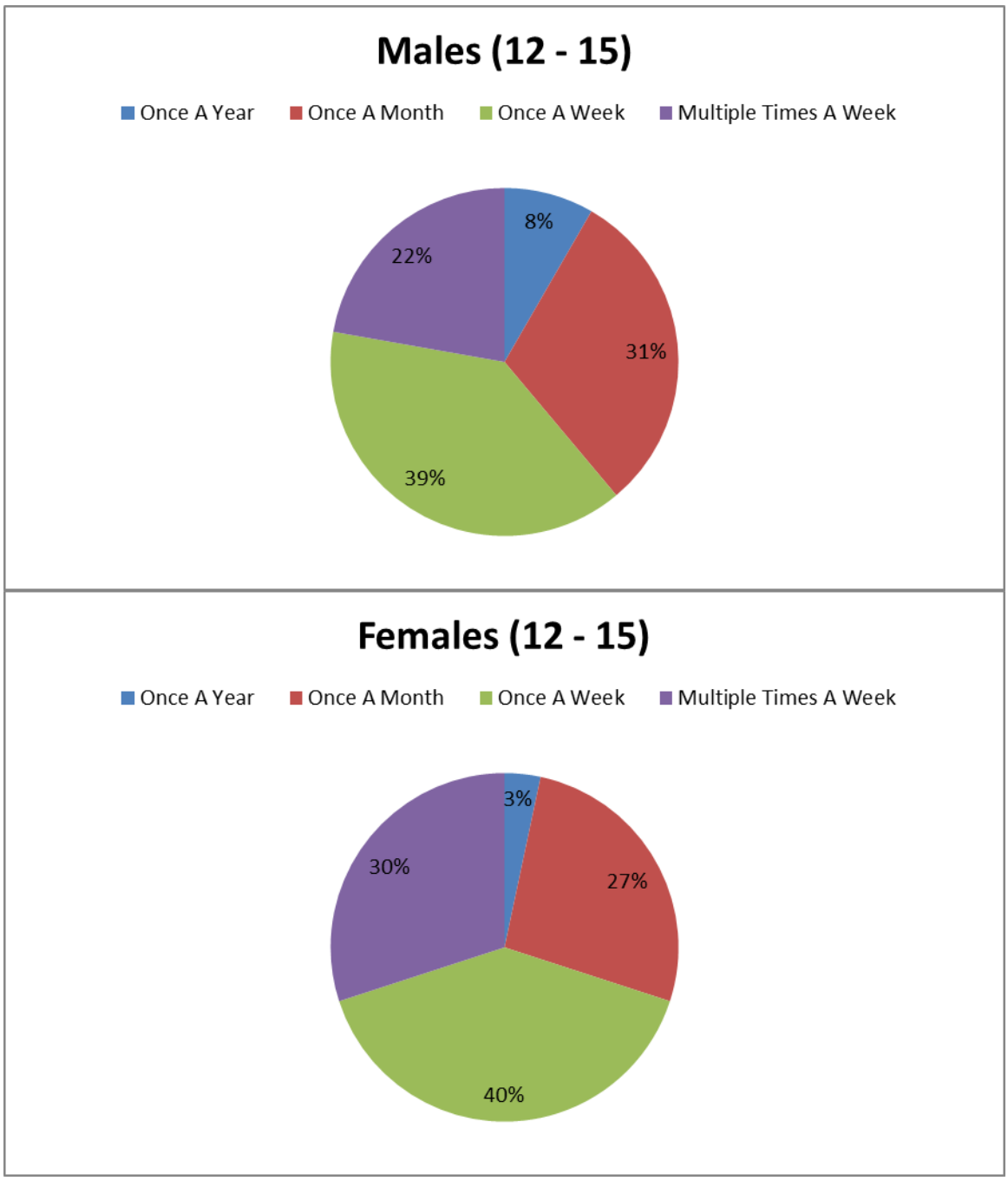
4.



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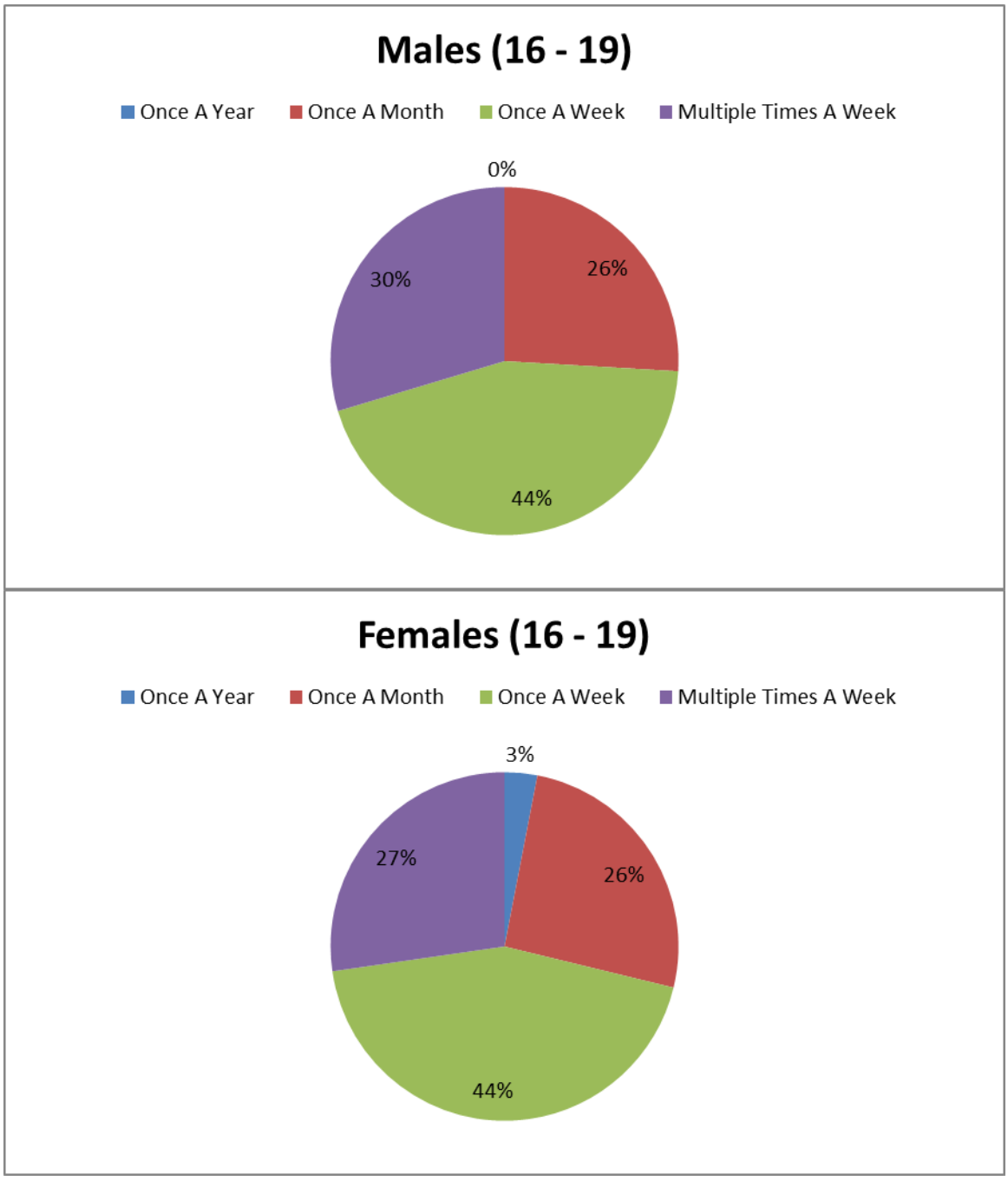

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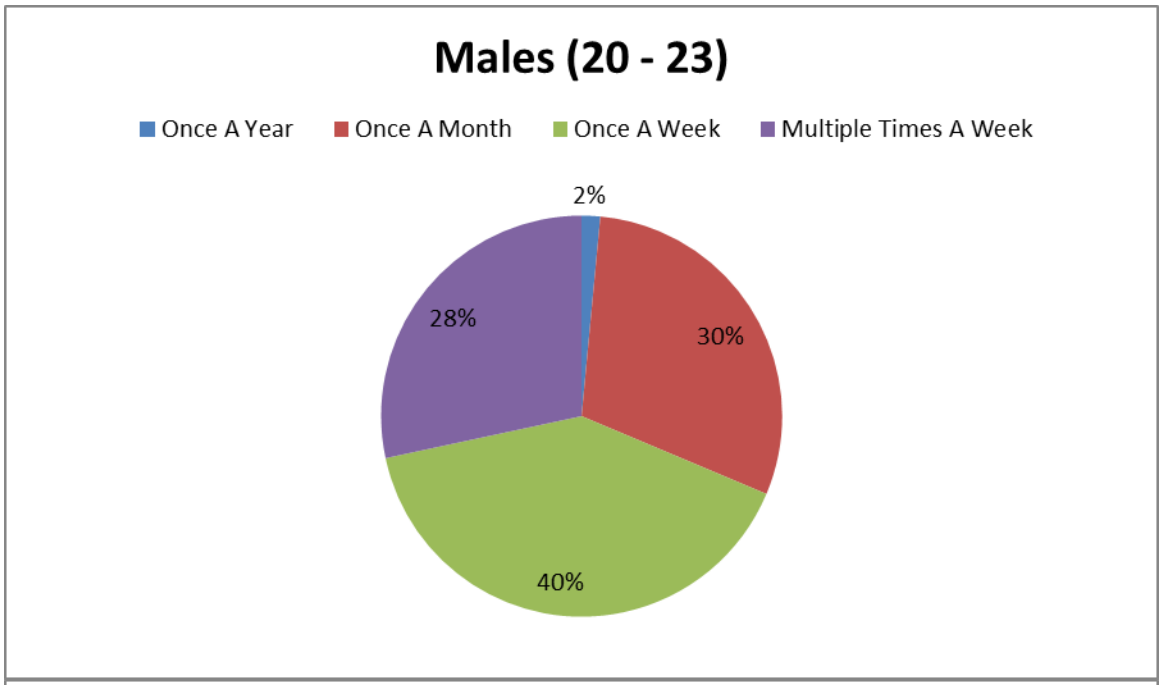
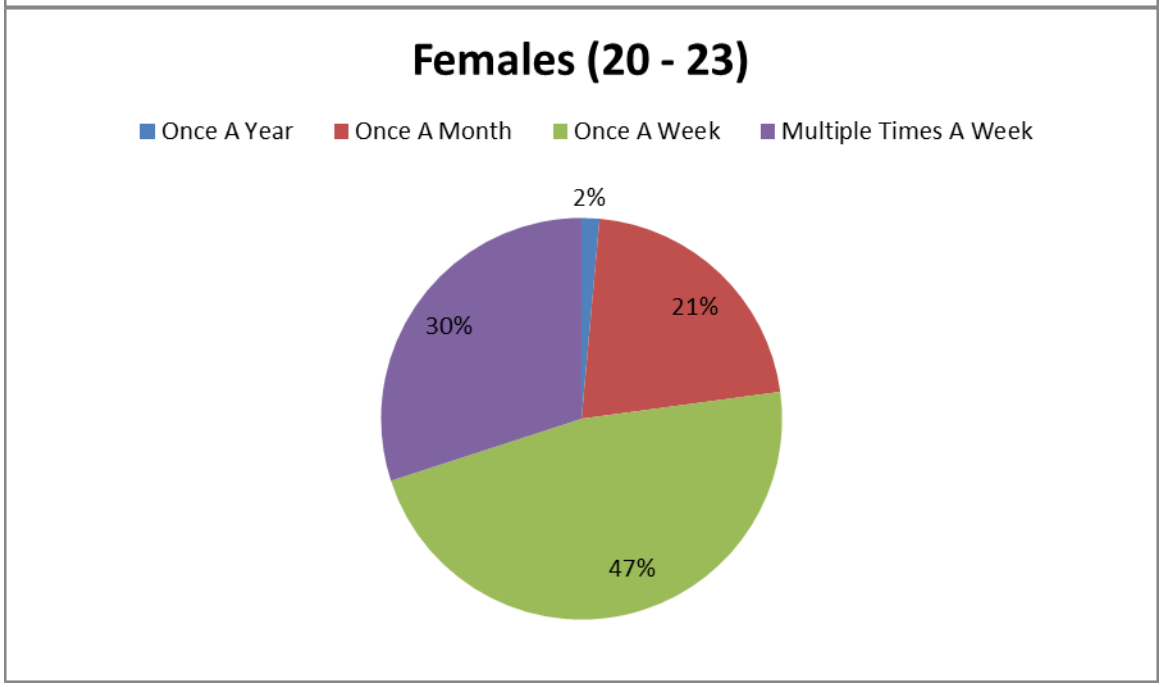
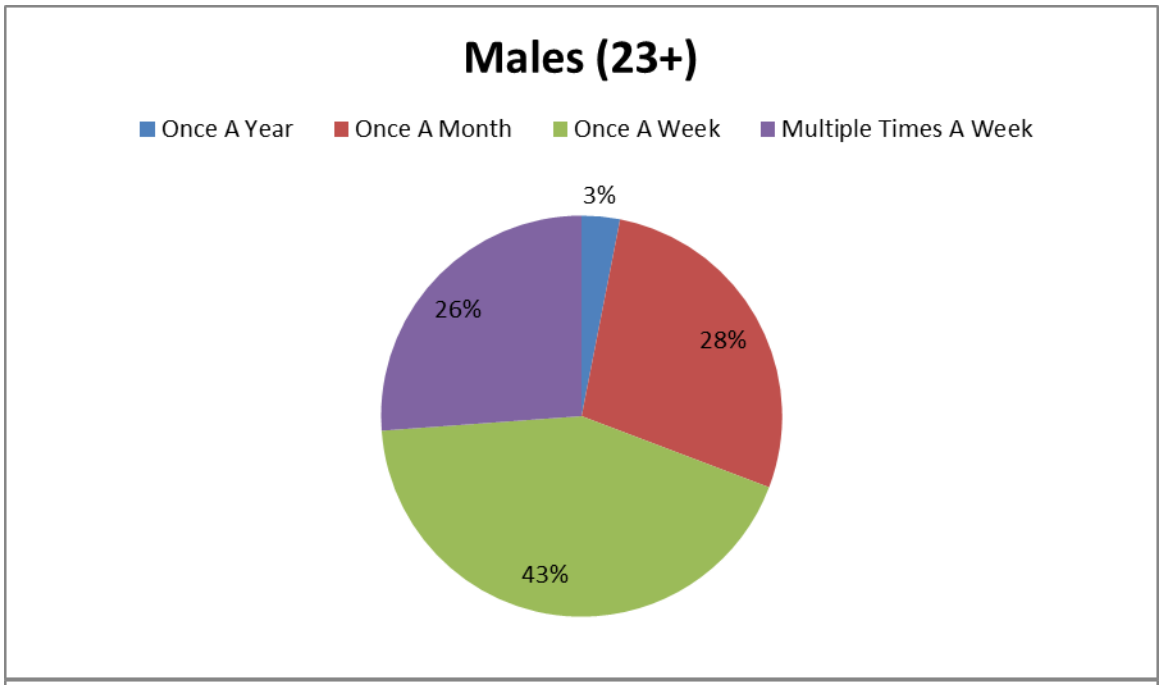
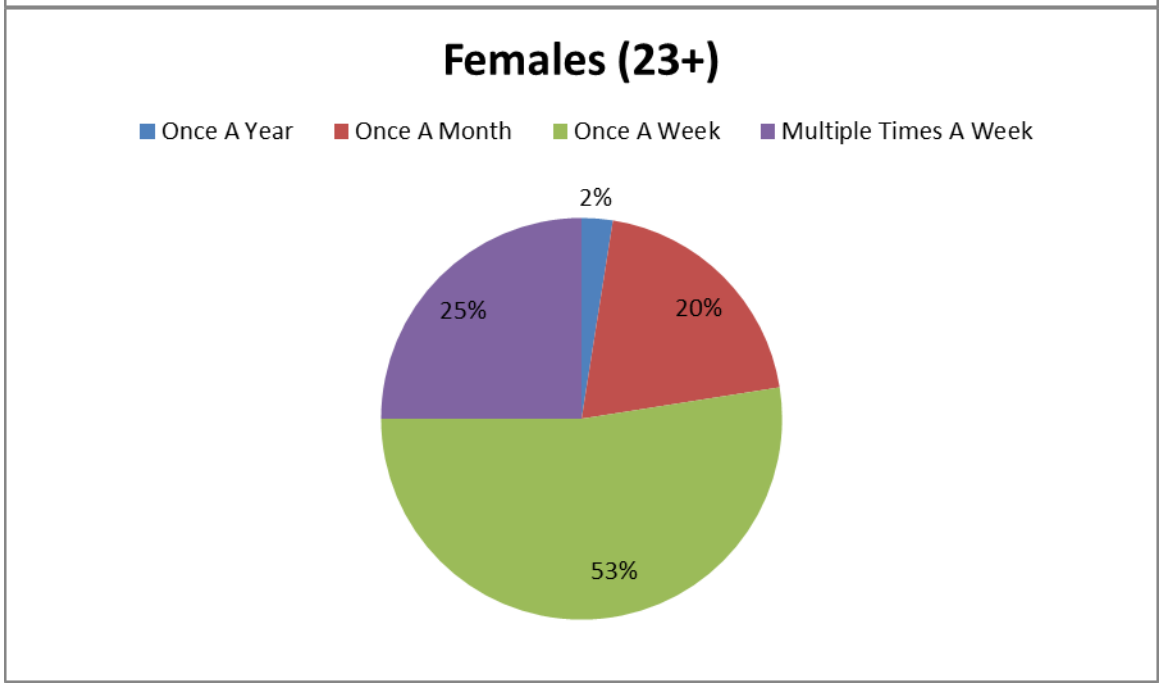

Males (20 - 23)
Once A Year
Once A Month
Once A Week
Multiple Times A Week
2%
30%
40%
28%


Females (20 - 23)
Once A Year
Once A Month
Once A Week
Multiple Times A Week
2%
21%
47%
30%





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