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|  | * Materials: * Sets of surveys * Answer sheets * Pen or pencil * Two separate rooms * Procedure * (1) Find 10 sets of identical twins, 10 sets of fraternal twins, and 10 sets of siblings with * the closest age difference possible (in this particular experiment, all the subjects are * high school teenagers between 14-18 years of age). * (2) Conduct a survey of about 20 to 25 questions. The types of questions should have a * large range that can measure the different aspects of the subjects� personality traits. * There are 5 answer choices to choice from for each question. * (3) Set a time (preferably at the same time of the day). Separate each set of twin/sibling * two rooms. Read them the instructions indicating that they would fill out the survey * once on how they themselves would answer the questions, then again on how they * think their twin/sibling would answer. Put the answers on the answer sheet provided. * Don�t explain to them the purpose of the study, so as to not affect their answers. * (4) Gather all the data from the surveys and put them into charts and graphs. Use * statistical analysis calculate the correlations among the data, and draw conclusions. * Data * **SURVEY ANALYSIS**  The survey was the most crucial part of our project. We had to carefully think through every question and answer choice. This survey tests if genes are primarily responsible for the similarity in thoughts, personality, and other psychological characteristics in twins or whether it is due to other factors. We gathered an assortment of questions from scientific surveys, personality surveys, and psychological surveys and combined them with our own questions. Our goal was to ask questions that most people have not thought about or asked their twin or sibling about. This eliminates the variable that since the twins already know each other so well they should know the answer. The answer choices have been carefully thought over and analyzed for the best results. The questions are placed in a specific sequence to prevent the test subjects from predicting what the survey is about and trying to purposely create misleading data. Each question has five answer choices. For each question, the first and last answer choices are the two extremes. The moderate answer choices are in the middle. There are 27 questions, but three of them serve the purpose of preventing the test subjects from knowing the object of the survey. There are a variety of types of questions such as situational questions and in-depth questions. Since our test subjects were in age from 14-18, our questions were designed so that our test subjects could relate to them. We also made sure we had a wide range of questions so all different types of people in this age group could relate to as many questions as possible.           The following is the actual survey with analysis:  **Survey Instructions:** Please take your time in filling out the survey and put **your answers** on the **left column** of the answer sheet provided. Then fold the paper in half along the dotted line and start the survey over again from question #1. This time, answer the questions according to how **YOU THINK your twin or sibling may answer,** and circle the corresponding letters on the **right column** under "Twin/Sibling". Each question is crucial to the research, so please read each question carefully and indicate the option that applies best. Please, be honest and answer according to what you *really* do, feel, or think. There is no right or wrong answer. The answers you provide are for data gathering purpose only and will be completely anonymous.   1. Which of the following colors do you like the best? a. White b. Red c. Blue d. Green e. Black  **This question was one of the ones that were thrown out. It�s purpose was just to warm up the test subjects and ease them into the survey.**   2. Which of the following activities would you enjoy the most? a. Video game marathons b. Tennis c. Biking d. Football e. Bungee jumping  **Video game marathons involve minimum risks while bungee jumping has the most risk. Both of these activities are on the extreme ends of the spectrum, one involving no risk at all and the other being extremely risky. Tennis is a little bit more adventurous than playing video games, but less adventurous than biking. Next comes biking as it is a little more outgoing than playing tennis. Football is a lot more rough than biking. The most risky activity is bungee jumping.**  3. You wake up one morning and your bed is swarming with \_\_\_\_\_\_\_\_. If you had to choose one of the following which one would it be? a. Snails b. Worms c. Spiders d. Lizards e. Snakes  **This question is another one of the least extreme to the most extreme. Most people know what creatures they are most afraid of, but they usually have not thought about or discussed what creature they *like* the most.**  4. If you forgot your sibling�s birthday, what would you do to make up for it? a. Throw him/her a surprise party even though it�s late b. Get him/her a small gift c. Take him/her out to lunch d. Get a late card e. Doesn�t matter. He/she knows you care anyway  **This question is the situation type of question. The answer choices range from the person who would actually take action to a person who doesn�t really care.**   5. You are going to a local grocery store to pick up a few items. Before you leave the house, you would: a. Spend a long time dressing up because you are afraid you might see someone you know b. Pick out a semi- casual outfit that�ll give a good impression c. Take a look in the mirror and make sure you look presentable d. Grab the first outfit you see in your closet and put it on e. It doesn�t matter. Just go with what you are wearing even if it�s your pajamas  **This is also a person who cares the most about their looks to the person who does not care at all.**   6. Pretend you have been battling your weight problem for a long time. You�ve been on and off numerous diet programs, but you have not been able to stay with any one of them. You have finally decided to lose weight and stay fit no matter what the cost. Which weight-loss strategy would give you the best chance of reaching your goal? a. Begin an *extremely easy* program (substituting certain items with low fat/low calorie equivalents) that will require *little willpower* and will yield first results after *several weeks* *b.* Begin a *regular* diet that will yield a loss of *a few pounds* within the *first two* *weeks* and *leave exercising alone* since you hate it anyway *c.* Begin a *regular* diet that will yield a loss of *a few pounds* within the *first two* *weeks* and combine it with *light exercise* d. Begin a *crash* diet that will yield a loss of *several pounds* within *days* and *leave exercising alone*, since you hate it anyway e. Begin an *extremely difficult* program (crash diet & heavy exercise) that will require *a lot of willpower* and will yield *first results within days*  **This question involves some more thinking for the subjects. The answer choices range from least extreme to most extreme.**          7. You are stuck in a traffic jam on a hot summer day. What would be your typical response? a. Take the time to relax and wind down b. You always have something in your car for such situations (homework, book, magazine, CD, etc.) c. Use this valuable time to make eye contact with someone cute d. Express your frustration by biting your nails or engaging in a nervous habit e. Vent by swearing, honking your horn, and hitting anything in your car  **This is another situation type question. The answer choices run from one extreme to another. Answer choice (a) would be a relaxed, easy going type person while answer choice (e) would be a nervous, paranoid type person. The middle answers range from being relaxed and occupied (choice b) to being more nervous (choice d).**   8. How much time does it take for you recover from an injustice on the road (ex. someone cuts you off). (If you can�t drive, pretend that you can) a. None, I don't care about such things b. A couple of minutes c. A couple of hours d. The rest of the day e. A few days  **This is least extreme to most extreme. The person who chooses answer choice (a) would be an easy going type person who does not become angry at minor details while the most extreme (choice e) is easily irritable. This person suppresses their anger in for too long.**   9. You are in the middle of a heated argument with your boyfriend/girlfriend/friend. Although you normally like this person, you are so furious that you are about to say something very nasty, something that you know will hurt him/her. To deal with this type of situation you would: a. Start crying b. Let the anger out and apologize later on because it is unhealthy to bottle up emotions c. Say whatever is on your mind; he/she needs to know how you feel and deal with it d. Give yourself a time out and continue after having calmed down e. Proclaim that you refuse to have a battle of wits with an unarmed person and walk away  **This is another situation question. One extreme would be a person who would cry (choice a) while the other extreme would be a person who would walk away from the situation (choice e).**      10. Your best friend's grandma died a month ago. They were very close and your friend is devastated. You would: a. Take your friend out to do what he/she desires b. Encourage him/her to cry it out c. Hang around and be available d. Tell him/her to toughen up and get over it; life goes on f. Leave your friend alone and not to disturb him/her  **Answer choice (a) involves the person who would take the most action while answer choice (f) involves the person being the most passive by not doing much about the situation.**   11. You and your group have been working on a school project for hours. Everybody is basically stuck and getting tired and edgy. In this situation, you would: a. Tell a joke, or find another way to make people laugh (to lighten the situation) b. Motivate the group with encouraging words c. Take turns in making suggestions d. Initiate brainstorming to come up with new ideas e. Put pressure on the group, telling them that this is not a joke - they better figure out something, and fast!  **This question really shows a person�s attitude in how they approach a situation. Answer choice (a) would be the most optimistic, light type person while answer choice (e) would be the most serious, aggressive type person.**   12. You have been working on your term paper for months. At the last minute, your crush asks for your term paper so he/she can copy it. You would: a. Give him/her the paper, but feel guilty about it later for breaking your own values b. Give him/her the paper, hoping you two can get together after this c. Offer to help him/her on the term paper, so you can have an excuse to get to know this person d. Tell him/her you will think about it, then call your friend up for advice e. Say no. Such a person who can�t think on their own is not worth having a crush on  **This question directly aims at teenagers. Answer choice (a) is a more passive type person who would sacrifice their own values for the sake of others. On the other hand answer choice (e) is a strong headed person, who won�t even compromise. Answer (c) is right in the middle as the person won�t sacrifice their values, but won�t mind compromising a bit.**         13. You just had an extremely bad haircut. You think: a. "My life is over; my hair will never grow back." b. "This is going to ruin my social life." c. "I�ll wear a wig until my hair grows back." d. "Those who really care about me won't mind about my hair." e. "Who cares about hair. No big deal, it will grow back."  **This type of person can range from a superficial, materialistic type person with a negative attitude (choice a) or to a person who is completely apathetic, but also has a positive attitude (choice e). Choice (b) is like choice (a) where the person is shallow. A choice (c) type person is more open to the situation, but still worried about their looks. Choice (d) is more optimistic and open to the situation.**   14. When you are upset, you can pinpoint exactly what aspect of the problem bothers you. a. Most of the time b. Often c. Sometimes d. Rarely e. Almost never  **This question starts a new category of questions. For these questions the answer choices are also extremes, but range from "most of the time" to "never."**   15. You open up and talk about your most intimate issues and private feelings with just about anybody, anytime, in any circumstances: a. Most of the time true b. Quite often true c. Sometimes true d. Rarely true f. Almost never true  **This question shows how open the person is with sharing their feelings.**   16. You can express your ideas clearly. a. Most of the time b. Quite often c. Sometimes d. Rarely e. Almost never  **This is another question that deals with how open the person is. It is similar to the previous one.**     17. You find it easy to see things from someone else's point of view. a. Most of the time true b. Quite often true c. Sometimes true d. Rarely true e Almost never true  **This question involves falls into the same genre as the former two. It shows the person�s personality and how well he/she understands situations**   18. The way to help others understand you is to tell them what you feel, think, and believe. a. Most of the time true b. Quite often true c. Sometimes true d. Rarely true e. Almost never true  **This question continues the pattern set by the other three. It shows how well you express your feelings and in what way you express your emotions. It also ranges from two extremes and the middle.**   19. When you see something that you like or want, you can't get it out of your head until you get it. a. Very true b. Mostly true c. Somewhat true d. Mostly not true e. Not true at all  **This question shows how stubborn, spoiled, or determined the person is depending on the way they look at the question. It�s kind of an open-ended question as the person can think of a variety of situations.**   20. You are in a shipwreck and find yourself on an abandoned island. The first thing you are going to do is: a. Just Cry b. Reflect back on all the happy moments of your life, knowing that soon you are going to die c. Build a fire as a signal for help d. Search for food and shelter e. Pretend you are Robinson Crusoe and treat this situation as an adventure  **This situational question deals with person�s attitude and how they approach difficult situations. It deals with the extreme pessimist (choice a) to the extreme optimist (choice e). Choice (b) is a really pessimistic person who gives up easily while choice (d) is more of a person who won�t give up and will get things done.**  21. If you could spend a day in one of the following places, which one would it be? a. Antarctica b. Mount Everest c. Cape of Good Hope (tip of South Africa) d. Sahara Dessert d. Death Valley  **For this question we purposely chose answer choices that most people have not thought about. All the answer choices are usually not places where people would choose to vacation at. This really forces the person to think.**   22. Which of the following mythological characters would you rather be? a. Elf b. Unicorn c. Fairy d. Wizard e. Dragon  **This is another question that deals with things most people have never discussed. This makes it difficult to predict what the twin or sibling will choose. The answer choices are all mythological characters and so the test subjects have to think.**   23. You are given a special ability for one day. You choose to be able to: a. Communicate with animals b. Read other people�s minds c. Be invisible d. Fly e. Time travel  **This is a question that most people don�t think about or if they do, they don�t bring it up in conversations. Ever ability tells a little about the person personality.**   24. In a situation where all the planets support life, which planet would you choose to live on? a. Venus b. Mars c. Jupiter d. Uranus e. Pluto  **This is definitely a question that most people don�t think about. We chose planets ranging from the closest to the earth to the farthest.**       25. What is the longest word in the dictionary? a. Superprocrastinationalagousist b. Antidisestablishmentarianism c. Smile d. Connoisseurion e. Supercalifragilisticespialidocious  **This was a trick question, but it reveals the way a person thinks. The correct answer is (b) as it is the longest word in the dictionary. The others are all made up, except for choice (c). The person could look at this question and say that the answer is choice (c) since there is a *mile* (the word smile) after the *s*. It�s a common riddle that many people know.**   26. What is your favorite store? a. Macy�s b. Gap c. Abercrombie & Finch d. Nordstrom e. JC Penny�s  **This question was another one that was thrown out. Its purpose was to allow the subjects to think less as they approach the end of the survey after previous questions that require much thinking.**   27. Whew! That wasn�t so bad, was it? Thanks for your time, and now that you�re done with the survey, what do you wish to do next? a. Go home and sleep b. Hurry home and study because you have a big test tomorrow c. Hang out with your friends d. Play some basketball e. You have no choice. Everyday, same routine, life sucks!  **This question was also thrown out. It was a "concluding" question to end the survey and intended to make it a little fun.**   **DATA**  The following are the answers of the test subjects from the survey. The data shows 24 questions instead of 27 questions from the survey because the first question and the last two questions on the survey were purposely eliminated. They served primarily to ease the test subjects into the survey. The data comes from 6 sets of identical twins, 9 sets of fraternal twins, and 10 sets of siblings between 12-18 months apart. For each set of twins/siblings, the first "Self" columns are the answers of how Person A answered the questions. Then the same person answered the questions again as to what they think their twin/sibling would answer. These answers are in the second columns labeled "Twin/Sib." Person B of the same set of twins/siblings took the survey in the same way as Person A did, and the answers are under the third and fourth columns of labeled "Self" and "Twin/Sib."  **Identical Twins:**  **Set 1 Set 2**  **Self Twin Self Twin**  **1** c c c c  **2** d b d c  **3** b b a a  **4** e b e e  **5** c b c c  **6** b d a c  **7** b b b b  **8** d b b c  **9** c c a a  **10** b a a d  **11** e e c e  **12** d a e d  **13** a a a a  **14** d d c d  **15** b b b b  **16** c b b b  **17** c c a b  **18** b a c b  **19** d d d d  **20** e b d c  **21** e d d d  **22** d d d c  **23** e c c b  **24** c a c e  **Self Twin Self Twin**  **1** b b b b  **2** a a a a  **3** e e e e  **4** d d d c  **5** e e e e  **6** a a a b  **7** b b b b  **8** c d d d  **9** d d d d  **10** d d d d  **11** e e c c  **12** e e e d  **13** a a a a  **14** e e e e  **15** a a a a  **16** e e a a  **17** a a a a  **18** e e e e  **19** c c c d  **20** b b b b  **21** d b d d  **22** b b d e  **23** b b a a  **24** e a c c  **Identical Twins:**  **Set 3 Set 4**  **Self Twin Self Twin**  **1** e e e e  **2** c b b d  **3** e a b e  **4** e c d e  **5** c d e e  **6** e b b e  **7** b a a a  **8** e c c a  **9** d c c c  **10** a a a a  **11** a a a b  **12** e e e e  **13** a a a c  **14** a e e d  **15** e e c c  **16** a c b e  **17** c a a a  **18** a e a a  **19** d c c a  **20** e a b e  **21** c c c c  **22** c d e c  **23** d e e d  **24** c c c c  **Self Twin Self Twin**  **1** d e e d  **2** a b a a  **3** e e b b  **4** d d e c  **5** e e e e  **6** d d d d  **7** b b b b  **8** c b b c  **9** c c c c  **10** a a e a  **11** c e c c  **12** e e e d  **13** b a c a  **14** d e b c  **15** b e c b  **16** b c a c  **17** c c a a  **18** d c d c  **19** d e d d  **20** c c c c  **21** c c e c  **22** d d d d  **23** b b e c  **24** a a a a  **Identical Twins:**  **Set 5 Set 6**  **Self Twin Self Twin**  **1** e d c c  **2** c c a d  **3** a b a a  **4** d d d d  **5** a a a a  **6** b c c b  **7** b b b b  **8** c c d b  **9** c c c c  **10** d b d a  **11** b d d d  **12** e e e e  **13** b c c c  **14** c d c d  **15** c b c c  **16** d a d d  **17** c d e e  **18** a b b b  **19** d a c d  **20** b e c c  **21** e c e a  **22** c b b a  **23** b d c e  **24** e e e e  **Self Twin Self Twin**  **1** e a c e  **2** d c e e  **3** d d e e  **4** d b e a  **5** b c a b  **6** b b c b  **7** b c a a  **8** d d b b  **9** b c a c  **10** a d c a  **11** a c b a  **12** e d a c  **13** c c d e  **14** a d a c  **15** c c a b  **16** a d a b  **17** c a a b  **18** b b c d  **19** d c e c  **20** b d e e  **21** b e b a  **22** c d d c  **23** b c e b  **24** e c a a  **Fraternal Twins:**  **Set 1 Set 2**  **Self Twin Self Twin**  **1** c c c c  **2** a a e c  **3** e e c c  **4** c c c c  **5** c c c c  **6** b b b b  **7** b b b b  **8** d b d b  **9** a a c c  **10** a a d b  **11** c c c c  **12** e e b a  **13** a a b b  **14** d d e d  **15** a b b a  **16** b b c c  **17** c c d c  **18** c b c b  **19** d d c d  **20** c c b b  **21** d c c c  **22** b b e d  **23** b b b b  **24** e e e e  **Self Twin Self Twin**  **1** d d d d  **2** d d b d  **3** e e d d  **4** c b c c  **5** c c c a  **6** d e e a  **7** b b b b  **8** d c b d  **9** a a a a  **10** b a d b  **11** e e c d  **12** a b b d  **13** c b b c  **14** c c b c  **15** c b b c  **16** b c c b  **17** b b b c  **18** d b a c  **19** d c d d  **20** c c c c  **21** d c c c  **22** d e d d  **23** b c a b  **24** e e c c  **Fraternal Twins:**  **Set 3 Set 4**  **Self Twin Self Twin**  **1** c a a c  **2** d d d d  **3** b b b b  **4** e d c b  **5** e d e c  **6** c b a b  **7** b b b b  **8** d c d d  **9** c a c a  **10** a a a c  **11** c e b c  **12** d d e d  **13** a b a a  **14** d e e c  **15** b c a a  **16** b c b b  **17** c c b a  **18** d c d c  **19** d c d c  **20** b c a b  **21** b e d b  **22** d e e a  **23** e b e a  **24** e e b b  **Self Twin Self Twin**  **1** a e e a  **2** a a b c  **3** e e e e  **4** d e c d  **5** a e c c  **6** b e b b  **7** a b a a  **8** c b e d  **9** a a c a  **10** a a a b  **11** c e c b  **12** d d d d  **13** b b a b  **14** c c e e  **15** b a a b  **16** a a a c  **17** b b a a  **18** c c c b  **19** e d e a  **20** c c c c  **21** d e d a  **22** c e b c  **23** c c a a  **24** b b b b  **Fraternal Twins:**  **Set 5 Set 6**  **Self Twin Self Twin**  **1** d d d d  **2** a a d d  **3** d d b c  **4** e c c d  **5** c c e e  **6** d d c e  **7** b b b b  **8** d c d b  **9** c c c c  **10** a a c c  **11** a a c b  **12** e d e e  **13** c c a c  **14** e d c d  **15** b b b c  **16** b c a d  **17** c c c c  **18** c c b c  **19** e c d d  **20** c c c a  **21** d e a e  **22** a e c d  **23** e b e d  **24** e e e e  **Self Twin Self Twin**  **1** d c c d  **2** d d b b  **3** d d e e  **4** c e e a  **5** c c e c  **6** e e e e  **7** c c c c  **8** b b b b  **9** d d c c  **10** b b a e  **11** e e b b  **12** e e e b  **13** a a b b  **14** c b b c  **15** c c b c  **16** c c a c  **17** b b b c  **18** b b b a  **19** d c c a  **20** c c a a  **21** d d d d  **22** c b d d  **23** b b b b  **24** e e b e  **Fraternal Twins:**  **Set 7 Set 8**  **Self Twin Self Twin**  **1** d c c a  **2** d a a d  **3** a a c c  **4** e c c c  **5** e c c c  **6** a b a a  **7** b c a b  **8** b c b b  **9** c c c c  **10** a d d a  **11** b a a b  **12** b a a b  **13** a a c c  **14** d e d d  **15** a a a a  **16** b c c c  **17** a a b b  **18** d a b c  **19** e d d c  **20** c c b c  **21** d b b d  **22** d d c c  **23** e e c c  **24** b e e e  **Self Twin Self Twin**  **1** b b d b  **2** d d b b  **3** b a b b  **4** b e c a  **5** c a e a  **6** b e b c  **7** b c b b  **8** a c c a  **9** a a c c  **10** c e e a  **11** b a a a  **12** b e d a  **13** c c a a  **14** e d d d  **15** b d b d  **16** b d c d  **17** a a b c  **18** b d d b  **19** d e e a  **20** c b c c  **21** b b b b  **22** b b b b  **23** e c a a  **24** c c e e  **Fraternal Twins:**  **Set 9**  **Self Twin Self Twin**  **1** d d d d  **2** b d d b  **3** d d d d  **4** c c c c  **5** e c c c  **6** e b b e  **7** b b b b  **8** c d d c  **9** b b b b  **10** a b b a  **11** e e e e  **12** e d d e  **13** b a a c  **14** d e d e  **15** b a a b  **16** b a a c  **17** c c a c  **18** c e d d  **19** c d d d  **20** b b b b  **21** d b d d  **22** c c c c  **23** c a a c  **24** b b b b  **Siblings:**  **Set 1 Set 2**  **Self Sib Self Sib**  **1** b a d e  **2** b d e a  **3** b e d e  **4** c e c a  **5** e a c a  **6** c e e a  **7** b a b a  **8** c b c a  **9** c c c b  **10** c e a c  **11** c b d a  **12** a e d a  **13** a b a e  **14** d a d a  **15** b a c d  **16** b b b c  **17** a a c b  **18** a b a a  **19** a d b a  **20** b b c d  **21** b d e b  **22** e b e a  **23** c a b a  **24** b e b e  **Self Sib Self Sib**  **1** c c b b  **2** d d c c  **3** b b b d  **4** c a b c  **5** a b c c  **6** a c b a  **7** a c b b  **8** a c d c  **9** b b d d  **10** d d a a  **11** e c c e  **12** d b d b  **13** a c a b  **14** d d d d  **15** a a c a  **16** c c b c  **17** b a a a  **18** a a b b  **19** a a a a  **20** a a a a  **21** d d c c  **22** b b b b  **23** b b a a  **24** b b c c  **Siblings:**  **Set 3 Set 4**  **Self Sib Self Sib**  **1** b b b b  **2** c c d d  **3** b b b b  **4** c a b c  **5** e c c c  **6** b b a a  **7** a b a c  **8** b b c d  **9** c c c c  **10** a a a a  **11** e c e e  **12** d b e e  **13** b b b a  **14** c c d d  **15** b b b b  **16** b c b c  **17** b c a a  **18** c a c c  **19** e e c c  **20** b a c b  **21** c c c b  **22** d c b c  **23** c b a b  **24** c c b b  **Self Sib Self Sib**  **1** b b b a  **2** d d d e  **3** b d b b  **4** c d c b  **5** a a c c  **6** a a b b  **7** b b b b  **8** c c d a  **9** c c c b  **10** d d a b  **11** e e c c  **12** d d b d  **13** b b a c  **14** d d e c  **15** b b a b  **16** c b b b  **17** c c b c  **18** c c c c  **19** c c a a  **20** d d d b  **21** d e c b  **22** b a c c  **23** b b b b  **24** b b b b  **Siblings:**  **Set 5 Set 6**  **Self Sib Self Sib**  **1** b b b b  **2** a a a b  **3** e e a d  **4** e c c d  **5** a a c c  **6** a a b b  **7** a a b d  **8** c b d c  **9** c c c d  **10** d e b e  **11** e e e e  **12** e e e e  **13** c b a a  **14** e e c d  **15** c c a a  **16** c c b c  **17** e c b b  **18** c e c c  **19** d c c c  **20** a b a a  **21** d d d d  **22** a c b b  **23** e d d d  **24** b b e e  **Self Sib Self Sib**  **1** c c d b  **2** a b b c  **3** e b e b  **4** d c d e  **5** c b e e  **6** a b b b  **7** b c a a  **8** d d b c  **9** b a d c  **10** b a c c  **11** c a a c  **12** e e b e  **13** a d b d  **14** e d e e  **15** a c c b  **16** b c c b  **17** b b d c  **18** b c c c  **19** d b a c  **20** b a b b  **21** c c e a  **22** d d c d  **23** e c d e  **24** c c b b  **Siblings:**  **Set 7 Set 8**  **Self Sib Self Sib**  **1** e d b e  **2** a a d d  **3** b b a a  **4** c c c c  **5** a a c c  **6** b a b d  **7** b b b b  **8** a c a c  **9** c b c c  **10** a d b a  **11** c c d e  **12** d d a b  **13** a a b c  **14** d c b d  **15** b b d a  **16** c b c c  **17** a a a c  **18** c c b a  **19** e c a a  **20** c c b b  **21** c c c d  **22** e d d d  **23** c e c c  **24** c d e e  **Self Sib Self Sib**  **1** c b b c  **2** a b a a  **3** e b b b  **4** a c c c  **5** e c c c  **6** b b b b  **7** b c a a  **8** c b b e  **9** c b a e  **10** b b b b  **11** e e d d  **12** b c a d  **13** c b d c  **14** d c c c  **15** c b e d  **16** c b c c  **17** b a b b  **18** d b a a  **19** c d c c  **20** d b b b  **21** c c c c  **22** d d d b  **23** c b b b  **24** e b e e  **Siblings:**  **Set 9 Set 10**  **Self Sib Self Sib**  **1** c b b b  **2** d d b a  **3** b e b b  **4** d d b b  **5** c b a c  **6** b b b b  **7** b a d b  **8** c c d d  **9** c e e c  **10** a c a a  **11** c e e e  **12** e e d e  **13** c c c b  **14** e c d c  **15** c d d b  **16** c d a b  **17** b b c b  **18** d d b c  **19** d d a a  **20** c c b a  **21** d c b d  **22** b d a d  **23** b a c a  **24** d d b c  **Self Sib Self Sib**  **1** d d b d  **2** d d c c  **3** e c e e  **4** e d c e  **5** e c e e  **6** d c b c  **7** b a b b  **8** d d d c  **9** c a a c  **10** d d b b  **11** c c c c  **12** d d d d  **13** a a a a  **14** e e d d  **15** c c c b  **16** c c c c  **17** a a a b  **18** b c c b  **19** d d d d  **20** c b c c  **21** b c c c  **22** e e e e  **23** e e b c  **24** c e e e  **DATA ANALYSIS**  For each set of twins/siblings, the answers under "Self" of Person A is compared with the answers under "Twin/Sib" of Person B to see how many answers are in common. The same is done with the answers under "Twin/Sib" of Person A and "Self" of Person B. Such a comparison shows how well the twins can think what the other twin will respond and also the similarities of their thoughts. Then, the answers under "Self" of both Person A and Person B are compared as well. This comparison shows the extent of similarity in their personality traits. The following are the final counts and percentages of the answers that were matched up to be the same:  Comparison of "Self" vs. "Twin/Sib" Answers  Number of Common Answers Total Number of Questions  Identical Twins 138 288  Fraternal Twins 206 432  Siblings 165 480  Figure 1: "1" is Identical Twins, "2" is Fraternal Twins, "3" is Siblings  Comparison of "Self" vs. "Self" Answers  Number of Common Answers Total Number of Questions  Identical Twins 63 144  Fraternal Twins 84 216  Siblings 165 480  Figure 2: "1" is Identical Twins, "2" is Fraternal Twins, "3" is Siblings  The above data shows that twins have a higher percentage of having the same answers than siblings. To test whether the data is reliable, or statistically significant, a chi-square test is performed. A chi-square test is a test to see whether there is a relationship between two or more categorical variables. In this case, it is the relationship between the three different types of relationships (identical, fraternal, and sibling) and the number of the "common answers" they chose on the survey. Before the calculation of the test is performed, the Ho (null hypothesis) and the Ha (alternative hypothesis) are set. The P-value is then calculated to determine whether to "reject" or "fail to reject" the Ho. If the P-value is much smaller than the a-level (the rejection level; in this case, it is set at 5%), then the Ho is rejected. Thus, it would then show that the data is statistically significant.  **Chi-Square Test 1**  **Test on Significance of Answers for "Self" vs. "Twin/Sib":**  Ho: There is no relationship between the identical twins, fraternal twins, and siblings  verses the number of common answers from the survey  Ha: There is a relationship between the identical twins, fraternal twins, and siblings verses  the number of common answers from the survey  Assumptions: SRS (Simple Random Sample)  Population > 10 times sample size  Expected value > 1  Number of Number of  Common Answers Non-Common Answers Total  Identical Twins 138 150 288  Fraternal Twins 206 226 432  Siblings 165 315 480  Total 509 691 1200  Expected count = (row total x column total) / table total  Expected Values Observed Values  Common Non-Common Common Non-Common  Identical Twins 122.16 165.84 138 150  Fraternal Twins 183.24 248.76 206 226  Siblings 203.60 276.40 165 315  X^2 = S (observed count � expected count)^2 / expected count  = 2.054 + 1.513 + 2.827 + 2.082 + 7.318 + 5.391  = 21.185  Degree of Freedom = (row � 1)(column � 1) = 2  By looking up the degree of freedom and the X^2 on the chi-square table:  P-value = 0 a-level = 5%  \* Reject Ho. The results show that the p-value of 0 is much smaller than the a-level. It is statistically significant enough to prove that there is a relationship between the identical twins, fraternal twins, and siblings verses the number of common answers from the survey. According to the data gathered, the fact that there is a higher percentage among the sets of identical twins in having the same answers, a little lower percentage among the sets of fraternal twins, and a much lower percentage among the sets of siblings did not happen merely by chance alone.  **Chi-Square Test 2**  **Test on Significance of Answers for "Self" vs. "Self":**  Ho: There is no relationship between the identical twins, fraternal twins, and siblings  verses the number of common answers from the survey  Ha: There is a relationship between the identical twins, fraternal twins, and siblings verses  the number of common answers from the survey  Assumptions: SRS (Simple Random Sample)  Population > 10 times sample size  Expected value > 1  Number of Number of  Common Answers Non-Common Answers Total  Identical Twins 63 81 144  Fraternal Twins 84 132 216  Siblings 85 155 240  Total 232 368 600  Expected count = (row total x column total) / table total  Expected Count Observed Count  Common Non-Common Common Non-Common  Identical Twins 55.68 88.32 63 81  Fraternal Twins 83.52 132.48 84 132  Siblings 92.80 147.20 85 155  X^2 = S (observed count � expected count)^2 / expected count  = 0.962 + 0.607 + 0.003 + 0.002 + 0.656 + 0.413  = 2.642  Degree of Freedom = (row � 1)(column � 1) = 2  By looking up the degree of freedom and the X^2 on the chi-square table:  P-value = 0.267 a-level = 5%  \*Fail to reject Ho. The results show that the p-value is much larger than the a-level. It is not statistically significant enough to prove that there is a relationship between the identical twins, fraternal twins, and siblings verses the number of common answers from the survey. According to the data gathered, the fact that there are seem to be a higher percentage in having the same answers among the sets of identical twins and fraternal twins than among the sets of siblings could have happened merely by chance alone. | |
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