65 questions, 4 pages name_____(req'd)

Answer every question (1-65) with a single bubble. If not specified otherwise, assume

A = True/yes B =False/no

Italicized statements should be taken as true.

If any part of a question is wrong, treat the entire question as wrong.

Scientific Method (SM)

1-8. Below are two paragraphs, each giving a description of a process with parallels to the scientific method. In the questions that follow each paragraph, you are asked to match a scientific method element with a quote taken from the paragraph. In each paragraph, the initial goal is underlined. You would select (A) if the quote describes a new goal.

1-4 (7pts) Jimmy develops an itchy rash on his skin over a large area of his abdomen. He wants the rash to go away. He suspects the cause is poison ivy and guesses that any of several commercial remedies will cure the rash. He buys 4 different topical remedies sold at the drug store. Each is applied to a different part of the rash. After a day of treatment, the part of the rash treated with J&J shows full recovery, but the other treated areas do not show any recovery. Based on this success from J&J, Jimmy decides 3 of the remedies are useless and treats the remaining areas of rash with J&J, achieving a full recovery a day later.

(A) Goal **(B)** central Model **(C)** Data **(D)** Evaluation **(E)** Revision **(F)** None

1. (A) (B) (C) (D) (E) (F) decides 3 of the remedies are bad

2. (A) (B) (C) (D) (E) (F) develops an itchy rash

3. (A) (B) (C) (D) (E) (F) any of several commercial remedies will cure the rash

4. (A) (B) (C) (D) (E) (F) the part of the rash treated with J&J shows full recovery

5-8 (7pts) In the difficult task of job hunting, you are not sure how best to get a job. Various friends give you different advice on whether to use a job-finding agency and which agency to use. Not sure about the best agency, you simultaneously try 3 different agencies. After 6 months, you compare the number of interviews obtained through each agency: you got 7, 3 and 2 interviews from the different agencies. You are happiest with the agency that got you 7 interviews, so you quit using the others.

(A) Goal **(B)** central Model **(C)** Data **(D)** Evaluation **(E)** Revision **(F)** None

5. (A) (B) (C) (D) (E) (F) 3 different agencies

6. (A) (B) (C) (D) (E) (F) after 6 months

7. (A) (B) (C) (D) (E) (F) you are happiest with the agency that got you 7 interviews

8. (A) (B) (C) (D) (E) (F) you got 7, 3 and 2 interviews from the different agencies

9-12 (5pts) Which statements about the workings or dynamics of the scientific method are true? **(A) = TRUE, (B) = False**

9. (A)(B) Without data, evaluation is not possible.

10. (A)(B) Without evaluation, there can be no data

11. (A)(B) After every evaluation, there is a revision

12. (A)(B) If a model is not rejected by data, it is considered proven.

13-16 (7 pts) In the following paragraph, indicate which elements of the Sci Met. are present. The goal is underlined. Do not assume more than is given in the text. **(A) = Present (B) = Absent**

You have an important social engagement this evening. As part of your preparations, you want your hair to look your best. For this goal, you decide to get your hair styled. You have no idea which stylist is best for you. One hour before the event, you go to the closest stylist and get your hair done. By the time the stylist is done, you are out of time and leave the stylist without even looking at your hair. You simply show up at the event and hope that your hair looks good.

13. (A) (B) Model

14. (A) (B) Data

15. (A) (B) Evaluation

16. (A) (B) Revision

17-21 (7 pts) To 'accept' the (central) model in an evaluation step of the scientific methods can mean which of the following about the model? **(A) = TRUE (B) = False**

17. (A)(B) The data support the model – the model looks as if it explains the data well.

18. (A)(B) The data are incompatible with the model – the model cannot possibly explain the data

19. (A)(B) It is not clear whether the data are compatible with the model – they could be.

20. (A)(B) The data shed no light on the model – we can say nothing about the success of the model.

21. (A)(B) The data do not reject the model.

Models (general)

22-24 (4 pts) You are told that a drug passed clinical trials and has been accepted as safe for human consumption. You know nothing about the composition of participants in the trial. Why might this drug not be safe for you even though it was found to be safe in the trial? **(A) True and a valid answer to the question (B) False and/or not a valid answer to the question**

22. (A)(B) the participants may be of different ages and gender than you

23. (A)(B) the participants may have different medical histories than you

24. (A)(B) the participants may have been restricted in food and other medications that you consume

25-28 (6 pts) You test snake venom in mice to understand its lethality to humans by using a syringe to inject mice with venom extracted from the snake and looking at mouse death rates. You then warn physicians that untreated bites from that snake are likely to kill people. What are limitations of this approach in predicting the chance a human will die from an untreated bite by this snake? The goal is underlined.

(A) a limitation that applies to this goal (B) Not

25. (A)(B) There may be a difference between venom acquired via injection versus a bite

26. (A)(B) The venom amount from injection may not be what a person would get from a bite

27. (A)(B) Other snake species have different venom compositions

28. (A)(B) The dose that kills a mouse may not be the same as what kills a human

29-33 (7pts) Matching models to goals. In which of the following contexts is a mouse used as a model of humans? If the possible human use is ambiguous, mark it as 'false.' **(A) = TRUE**

29. (A)(B) Using mice in tests of substances as a step toward approval for public consumption of those substances.

30. (A)(B) Using mice in tests of drugs that will be used by veterinarians for treating cats.

31. (A)(B) Studying mouse behavior to build a better mouse trap for use in people's homes.

32. (A)(B) Identifying genes for hairlessness in mice to understand how to cure baldness in men.

33. (A)(B) Studying mouse smell receptors to understand how mice find food.

Condom Testing (ABT is 'airburst test')

34-36. (5 pts) Which are true? **(A) = TRUE (B)= FALSE**

34. (A)(B) The ABT is considered to be weak on accuracy because it does not measure condom pore size.

35. (A)(B) Failure of a condom in the ABT means it would have broken during sex

36. (A)(B) Rejecting a batch of condoms because too many of the ones tested failed the test is treating the untested condoms as models of the tested condoms in the same batch.

37-39 (5 pts) Which condom tests are considered models of sex between people when used to judge a batch of condoms for approval to be marketed? **(A) = TRUE (B) = FALSE**

37. (A)(B) airburst test

38. (A)(B) water leak test

39. (A)(B) stretch test

DWI

(SFST is the standaridzed field sobriety test, BAC is blood alcohol concentration)

40-43 (6pts) Assign the following models of DWI testing in terms of A, C, or U. We are interested in these tests as models of driving performance. (The 3 tests are the SFST, BAC, and a hypothetical Road Test mentioned in class.)

40. Which model is most accurate?	(A) BAC	(B) SFST	(C) Road test
41. Which model is least accurate?	(A) BAC	(B) SFST	(C) Road test
42. Which model is least convenient?	(A) BAC	(B) SFST	(C) Road test
43. Which model has the greatest uniformity?	(A) BAC	(B) SFST	(C) Road test

44-46 (5pts) The SFST is considered a *convenient* model for assessing driver impairment. Why?

(A) Tue and also answers the question (B) False and/or does not answer the question

44. (A)(B) It measures behaviors pertinent to driving performance.

45. (A)(B) It can be administered almost anywhere and without any equipment.

46. (A)(B) It can be administered the same way to each subject.

Extrapolation

47-49 (5pts) Which dose extrapolation models are being invoked if we suggest that low doses are harmless when knowing that high doses cause harm?

47. (A)(B) linear

48. (A)(B) threshold

49. (A)(B) decelerating

50-53 (6pts) Which model(s) can possibly apply if we have data on the effect at high doses but don't have data on the effect at low doses?

50. (A)(B) linear

51. (A)(B) threshold

52. (A)(B) accelerating

53. (A)(B) decelerating

54-57 (6 pts) Extrapolation examples from the book. Which are true? **(A) = TRUE**

54. (A)(B) In the Rodent models of cancer example, the main problem identified is with animal extrapolation -- whether rodents are the right model organism to study cancer

55. (A)(B) The case of second-hand (tobacco) smoke changed from an initial linear extrapolation to an observation of a threshold model.

56. (A)(B) The erroneous fear that dioxin was exquisitely toxic to humans was based on a case of bad animal extrapolations.

57. (A)(B) Over the years, our assumptions about fetal alcohol syndrome have gone from a threshold extrapolation to a linear extrapolation.

58-60 (5pts) In 2013, the following question was given:

A tire company wonders how the tread of its tires is reduced with miles driven. Tests show that the rate of tread loss on a new tire is 1/16" per 10,000 miles. However, measurements on older tires show that, when the tire has 50,000 miles, the rate of tread loss has increased to 1/8" per 10,000 miles. What type of extrapolation, if any, underlies this change in the rate of tread loss with age/mileage of the tire?

Of the choices between 'Linear,' 'Threshold,' 'Accelerating,' and 'Decelerating,' the correct answer was 'None.' Why? **(A) = TRUE**

58. (A)(B) The data in the problem indicate that there was no change in the rate of tread loss, so the relationship is flat – not any form of extrapolation that we considered.

59. (A)(B) The data indicate that the trend is downward, and all forms of extrapolation we considered were upward.

60. A)(B) There is no extrapolation described because the change in tread loss is measured directly.

Themes

61-64 (7pts) (A) TRUE (B) FALSE

61. (A)(B) By using a combination of models with different strengths and limitations for a single goal, we can sometimes overcome limitations of any one model. This point was illustrated with models of condom testing.

62. (A)(B) Models are often used despite serious limitations, even when those limitations are known.

63. (A)(B) The long term objective of the scientific method is to find a single (central) model for the goal.

64. (A)(B) The long term objective of the scientific method is to find the most accurate (central) model for the goal.

65. (4 pts) Key code **A**. Bubble **A** on 65 of your scantron to indicate which version of the test you have; do not fill in any other bubbles. Correctly bubble in your EID and name in the appropriate blanks, and put your name on the first page of this exam form.