Mathematics Attitudes, Skills, & Knowledge Survey (MASKS)
Level 2 Form B

Directions to Students:

Do not open this booklet until you are told to do so. Please respond to the following items by marking the best answer on your answer sheet using a #2 pencil. Please do not write on this survey. Scratch paper will be provided on request. If you do not understand what is being asked in an item, please ask the survey administrator for clarification.

Calculators are not permitted on this exam.

Please Do Not Write On This Test Booklet

Arizona Collaborative for Excellence in the Preparation of Teachers
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1. Which best describes your race or ethnic background?

   A. American Indian
   B. Asian/Pacific Islander
   C. Hispanic
   D. Black
   E. Other

2. What is the highest level of education your mother obtained?

   A. did not finish high school
   B. high school graduate
   C. some education after high school
   D. college graduate
   E. I don't know

3. What is the highest level of education your father obtained?

   A. did not finish high school
   B. high school graduate
   C. some education after high school
   D. college graduate
   E. I don't know

Use the following key to indicate whether you agree/disagree with items 4 – 10.

A. strongly agree B. agree C. not sure D. disagree E. strongly disagree

4. I am not good at math.

5. I have not seem math used for solving real-life problems.

6. Math gives us useful ways to describe how things change.

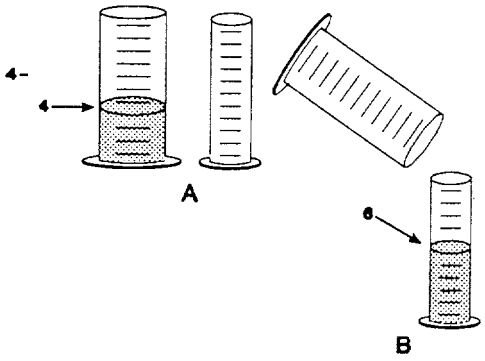
7. A goal of math is to represent/model real world situations.

8. Math formulas are used for expressing relationships among variables.

9. Graphing real world data is useful for determining patterns.

10. Different branches of mathematics like Geometry and Algebra have little relationship to one another.

11. To the right are drawings of a wide and a narrow cylinder. The cylinders have equally spaced marks on them. Water is poured into the wide cylinder up to the 4th mark (see A). This water rises to the 6th mark when poured into the narrow cylinder (see B).



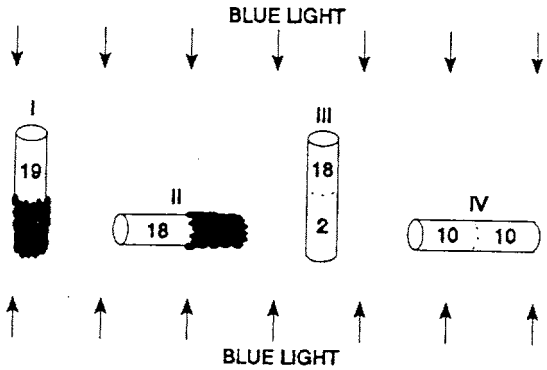
Both cylinders are emptied (not shown) and water is poured into the wide cylinder up to the 6th mark. How high would this water rise if it were poured into the empty narrow cylinder?

A. to about 8
B. to about 9
C. to about 10
D. to about 12
E. none of these answers is correct

12. because

A. the answer can not be determined with the information given.
B. it went up 2 more before, so it will go up 2 more again.
C. it goes up 3 in the narrow for every 2 in the wide.
D. the second cylinder is narrower.
E. one must actually pour the water and observe to find out.

13. Twenty fruit flies are placed in each of four glass tubes. The tubes are sealed. Tubes I and II are partially covered with black paper; Tubes III and IV are not covered. The tubes are placed as shown. Then they are exposed to blue light for five minutes. The number of flies in the uncovered part of each tube is shown in the drawing.



These data show that these flies respond to (respond means move to or away from):

A. blue light but not gravity
B. gravity but not blue light
C. both blue light and gravity
D. neither blue light nor gravity

14. because

A. some flies are in both ends of each tube.
B. the flies need light to see and must fly against gravity.
C. the flies are spread about evenly in Tube IV and in the upper end of Tube III.
D. most flies are in the lighted end of Tube II but do not go down in Tubes I and III.
E. most flies are in the upper end of Tube I and the lighted end of Tube II.

15. A student put a drop of blood on a microscope slide and then looked at the blood under a microscope. As you can see in the diagram below, the magnified red blood cells look like little round balls. After adding a few drops of salt water to the drop of blood, the student noticed that the cells appeared to become smaller.

Magnified Red Blood Cells After Adding Salt Water

This observation raises an interesting question: Why do the red blood cells appear smaller?

Here are two possible explanations: I. Salt ions (Na+ and Cl-) push on the cell membranes and make the cells appear smaller. II. Water molecules are attracted to the salt ions so the water molecules move out of the cells and leave the cells smaller.

To test these explanations, the student used some salt water, a very accurate weighing device, and some water-filled plastic bags, and assumed the plastic behaves just like red-blood-cell membranes. The experiment involved carefully weighing a water-filled bag in a salt solution for ten minutes and then reweighing the bag.

What result of the experiment would best show that explanation I is probably wrong?

A. the bag looses weight
B. the bag weighs the same
C. the bag appears smaller

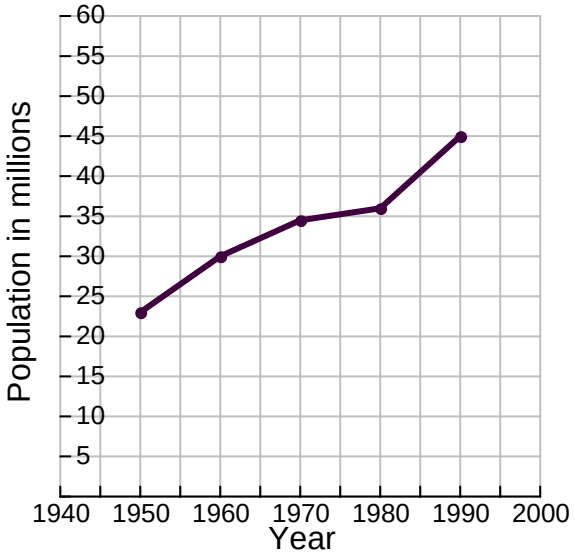
16. What result of the experiment would best show that explanation II is probably wrong?

A. the bag looses weight
B. the bag weighs the same
C. the bag appears smaller

17. Experts say that 25% of all serious bicycle accidents will involve head injuries and that, of all head injuries, 80% are fatal. What percentage of all bicycle accidents involve fatal head injuries?(TIMMS population 3 question A3)

A. 16%
B. 20%
C. 55%
D. 105%

18. If the population increases by the same rate from the year 1990 to the year 2000 as in the years from 1980 to 1990 approximately what is the expected population by the year 2000? (TIMMS population 3 A4)



A. 47 million
B. 50 million
C. 55 million
D. 58 million

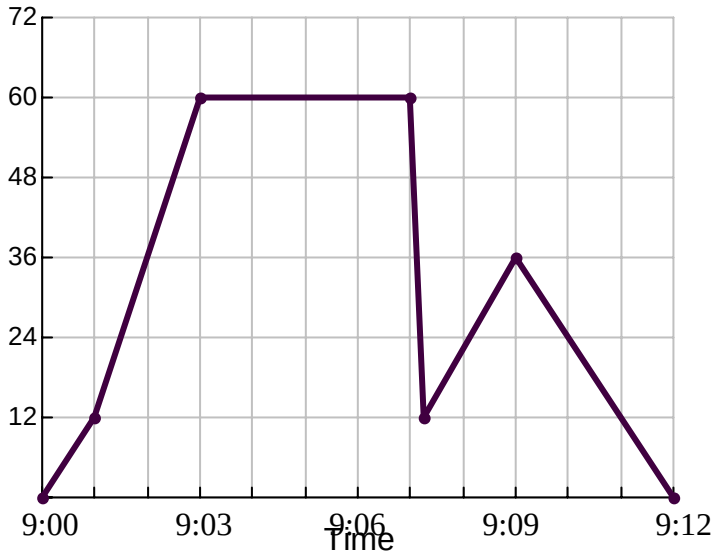
19. What are all values of x for which the inequality $5x+\frac{5}{3}\leq -2x-\frac{2}{3}$ is true? (TIMMS pop. 3 L1)

A. $x\leq -\frac{7}{9}$ C. $x\geq 0$ E. $x\geq \frac{9}{3}$

B. $x\leq -\frac{1}{3}$ D. $x\geq \frac{7}{3}$

Use the following situation to answer questions 20 and 21.

Kelly went for a drive in her car. During the drive a cat ran in front of the car. Kelly slammed on her brakes and missed the cat. Slightly shaken, Kelly decided to return home by a shorter route. The graph below is a record of the car's speed during the drive. (TIMMS pop.3 D15)



20. What is the maximum speed of the car during the drive?

A. 36 kph
B. 12 kph
C. 72 kph
D. 60 kph

21. What time was it when Kelly slammed on the brakes to avoid the cat?

A. approximately 9:01
B. approximately 9:03
C. approximately 9:07
D. approximately 9:09

22. Given $\log_b 2 = \frac{1}{3}$, $\log_b 32$ is equal to (TIMMS pop. 3 L2)

A. 2 C. $-\frac{3}{5}$ E. $\frac{3}{\log_2 32}$

B. 5 D. $\frac{5}{3}$

23. A radioactive element decomposes according to the formula $y = y_0 e^{-kt}$ where y is the mass of the element remaining after t days and y_0 is the value of y for t = 0. Find the value of the constant k for an element whose half-life (i.e. time to decompose half of the material) is 4 days. (TIMMS pop. 3 L3)

A. $\frac{1}{4}\ln 2$

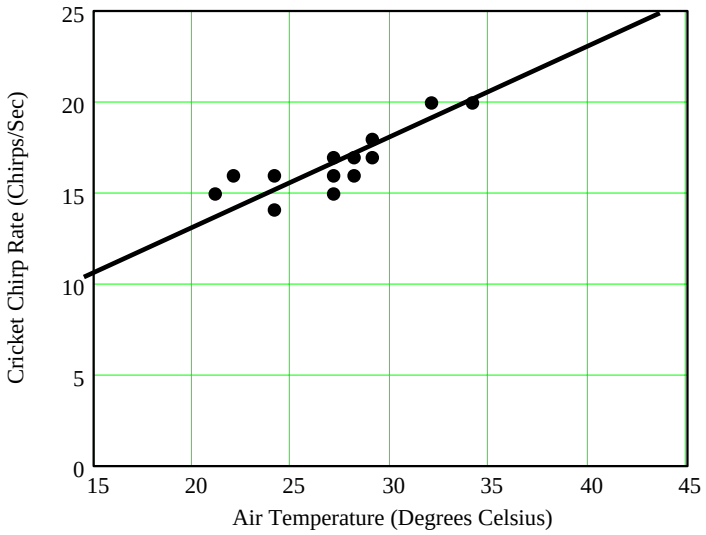
B. $\ln \frac{1}{2}$

C. $\log_2 e$

D. $(\ln 2)^{\frac{1}{4}}$

E. $2e^4$

24. Scientists have observed that crickets move their wings faster in warm temperatures than cold temperatures. By noting the pitch of cricket chirps, it is possible to estimate the air temperature. Below is a graph showing 13 observations of cricket chirps per second and their associated air temperature along with a line of best fit. (like TIMMS pop 3, L15)



Using the line of best fit, estimate the air temperature when cricket chirps of 22 per second are heard.

A. 37 Degrees Celsius
B. 14 Degrees Celsius
C. 25 Degrees Celsius
D. 45 Degrees Celsius

25. Given the table of values below determine the average rate of change from x = 2 to x = 6.

X	Y
1	15
2	18
3	25
4	33
5	42
6	58
7	72

A. 10
B. 58
C. 40
E. 4