

**Mathematics Attitudes, Skills, & Knowledge Survey  
(MASKS)  
Level 1 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***



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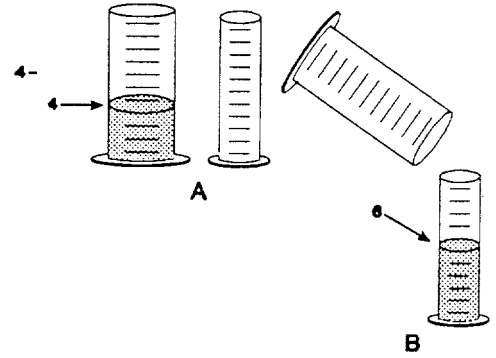
1. Which best describes your race or ethnic background?
  - A. American Indian
  - B. Asian/Pacific Islander
  - C. Hispanic
  - D. Black
  - E. Other
  
2. What is the highest level of education your mother obtained?
  - A. did not finish high school
  - B. high school graduate
  - C. some education 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

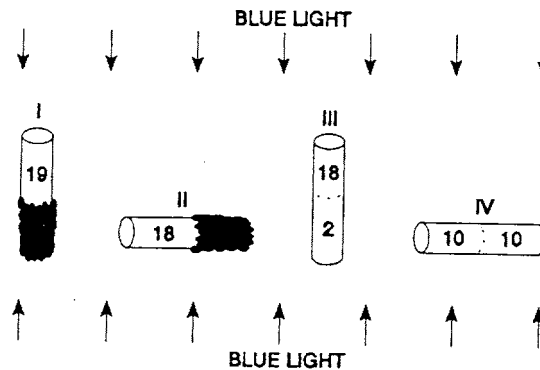
4. I am not good at math.
  
5. I have not seen math used for solving real-life problems.
  
6. Math gives us useful ways to describe how things change.
  
7. The central goal of mathematics is to model real world situations.
  
8. Math formulas are used for expressing relationships among variables.
  
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?

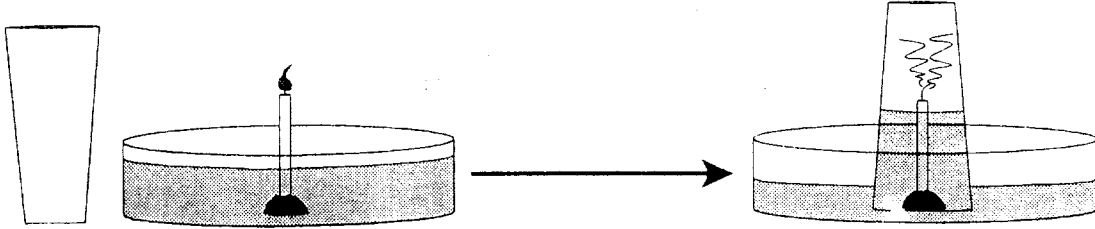
- A. to about 8  
 B. to about 9  
 C. to about 10  
 D. to about 12  
 E. none of these answers is correct
12. because
- A. the answer can not be determined with the information given.  
 B. it went up 2 more before, so it will go up 2 more again.  
 C. it goes up 3 in the narrow for every 2 in the 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
- some flies are in both ends of each tube.
  - the flies need light to see and must fly against gravity.
  - the flies are spread about evenly in Tube IV and in the upper end of Tube III.
  - most flies are in the lighted end of Tube II but do not go down in Tubes I and III.
  - most flies are in the upper end of Tube I and the lighted end of Tube II.
15. The figure below at the left shows a drinking glass and a burning birthday candle stuck in a small piece of clay standing in a pan of water. When the glass is turned upside down, put over the candle, and placed in the water, the candle quickly goes out and water rushes up into the glass (as shown at the right).



This observation raises an interesting question: Why does the water rush up into the glass?

Here is a possible explanation. The flame converts oxygen into carbon dioxide. Because oxygen does not dissolve rapidly into water but carbon dioxide does, the newly-formed carbon dioxide dissolves rapidly into the water, lowering the air pressure inside the glass.

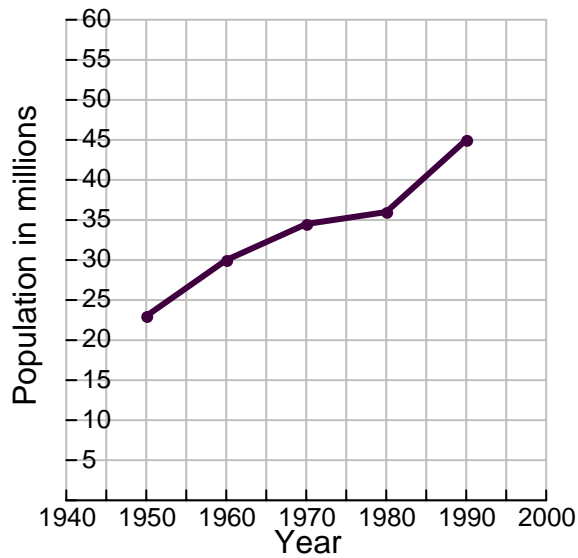
Suppose you have the materials mentioned above plus some matches and some dry ice (dry ice is frozen carbon dioxide). Using some or all of the materials, how could you test this possible explanation?

- Saturate the water with carbon dioxide and redo the experiment noting the amount of water rise.
  - The water rises because oxygen is consumed, so redo the experiment in exactly the same way to show water rise due to oxygen loss.
  - Conduct a controlled experiment varying only the number of candles to see if that makes a difference.
  - Suction is responsible for the water rise, so put a balloon over the top of an open-ended cylinder and place the cylinder over the burning candle.
  - Redo the experiment, but make sure it is controlled by holding all independent variables constant; then measure the amount of water rise.
16. What result of your test (mentioned in #15 above) would show that your explanation is probably wrong?
- The water rises the same as it did before.
  - The water rises less than it did before.
  - The balloon expands out.
  - The balloon is sucked in.

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)



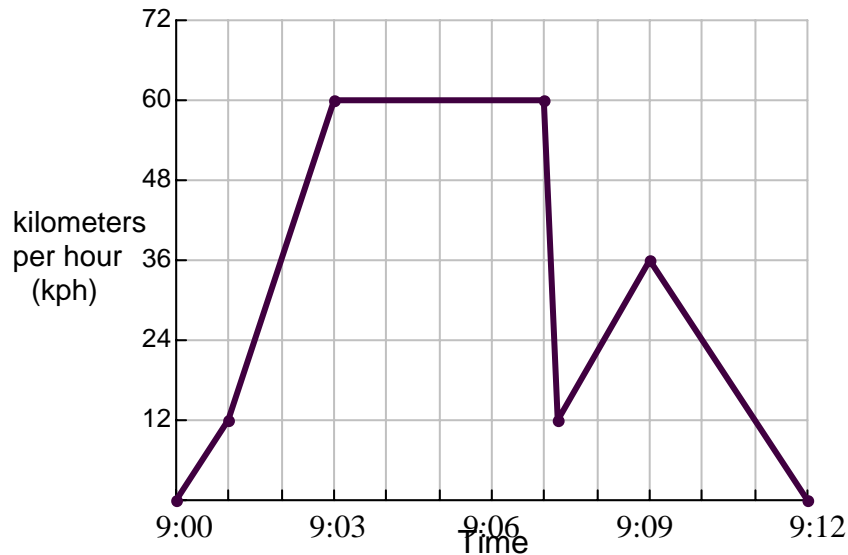
- A. 47 million
- B. 50 million
- C. 55 million
- D. 58 million

19. Find x if  $10x - 15 = 5x + 20$ . (TIMMS pop. 2 L16)

- A. 7
- B. 3
- C. 1
- D.  $\frac{1}{3}$

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. A car has a fuel tank that holds 35 liters of fuel. The car consumes 7.5 liters of fuel for each 100 km driven. A trip of 250 km is started with a full tank of fuel. How much fuel remained in the tank at the end of the trip? (TIMMS pop. 2 N17)
- A. 16.25 liters
  - B. 17.65 liters
  - C. 18.75 liters
  - D. 23.75 liters

23. Which of these expressions is equivalent to  $y^3$ ? (TIMMS pop. 2 P15)

- A.  $y + y + y$
- B.  $y \cdot y \cdot y$
- C.  $3y$
- D.  $y^2 + y$

24. Juan has 5 fewer hats than Maria, and Clarissa has 3 times as many hats as Juan. If Maria has  $n$  hats, which of these represents the number of hats that Clarissa has? (TIMMS pop. 2 Q1)

- A.  $5 - 3n$
- B.  $3n$
- C.  $n - 5$
- D.  $3n - 5$
- E.  $3(n-5)$

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
- A. 4