Bibliography


Fraser, B.J. (1978). Development of a Test of Science-related Attitudes. Science Education. 62(4), 509-515

Freeman, K., et. al. (1958). Helping Children U.S.A.


Davis, Maher and Noddings (eds.) *Constructivist Views on the 'reaching and Learning of Mathematics.* JRME Monograph, Reston, Virginia, NCTM.


WEBSITE AI) DRESSES ON CONSTRUCTIVISM

Available at http://www.bamaed.un.edu/ail607/cconsthtml


Building an Understanding of Constructivism. Available at http://www.sedl.org/scimath/compass/v1n03/inderstand.html
Achievement Test

Answer all the Questions  
Total : 50 marks

Time : 1 hour

I. Choose the correct answers:  
(5 Marks)

1) The gases used in advertising lamps are
   a) He & Ne  b) Ar & Kr  c) Ne & Rn  d) Ne & Ar
2) Water gives no reaction with litmus because it is
   a) Acidic  b) Basic  c) amphoteric  d) Colourless
3) Heat form the sum reaches us by the process of
   a) Radiation  b) Conduction c) convection  d) circulation
4) Fresh water of marine fish are rich in
   a) Vitamin A  b) Vitamin D  c) Vitamin A &D d) Vitamin E
5) Example of biodegradable pollutants is
   a) Sewage  b) Ceramics  c) PVC  d) Aluminum Cars

II. Fill in the blanks:  
(15 Marks)

1. Copper sulphate is colourless, but copper sulphate penta hydrate is blue in colour due to the presence of ________________
2. A floating magnet comes to rest in ________________ direction
3. Ventilation systems are based n the circulation of ___________ currents.
4. Spoilage of food is due to ________________
5. Practice of rearing silk worm is called__________________
6. The base of cooking utensils are painted black to ________________ more heat.
7. In a ferromagnetic substance a tome group themselves into ________________
8. The source of chlorofluorocarbons is ________________
9. Algal bloom is a type of pollution in ________________
10. Effect of global warning may be the ____________________________ in sea level.

11. ____________________ is the gas used for filling balloons.

12. The maximum density of water at 40c is ____________________

13. Hard water on boiling produces precipitates of ________________

14. Water that lather well with soap solution is called ____________

15. White coloured clothes are suitable in summer because they absorb _____________________ heat & keep body cool.

III. Answer in one or two words (10 Marks)

1) Name the material used to make fire fighting suites.
2) What coloured clothes should we wear in summer?
3) Name a process of demagnetization.
4) Which is the lightest gas?
5) What is blue vitriol?
6) Name one endangered species.
7) Name the most common adulterant of coffee powder.
8) Name one disease caused by water pollution?
9) What do you call rearing of bees as?
10) Do convection takes place in liquids?

IV. Short Answer (20 Marks)

1) Why table fans are cooler than ceiling fans.
2) Draw a thermometer.
3) Convert 100°F into °C.
4) How is a magnet demagnetized?
5) What happens when temporary hard water is boiled?
6) Is air a mixture or a compound?
7) State two effects of increase in global temperature
8) What is the reason for food spoilage?
9) Suggest remedial measures for water pollution.
10) Name the green house gases.
Science Process Skill Test

Supply the answers in a word or a sentence.
Each correct answer carries one mark

1) Hot milk in a big vessel and a glam of milk from it can be at the same temperature.
2) Table fans of pedestal fans keep the room much cooler than ceiling fans during summer why?
3) What coloured clothes should we wear in summer why?
4) What will happen when a bar magnet is dipped into iron fillings?
5) Take a plastic bowl or basin, Fill it with assorted things like iron, nail, steel pins, copper bits, rubber, wood etc., Tie one end of a piece of thread to a magnet of the other end to a pencil. Find out which of the things in the bowl are attracted by magnet.
6) Suspend a bar magnet take another magnet. Hold the north pole close to the north pole & South pole close to the north pole. Record your observations.
7) Place a wooden stand on a table Tie a string at the centre of a bar magnet & suspend it from the stand. In what direction does it come to rest?
8) What happens when you stir a cup full of hot drink with a metal spoon?
9) Heat water in 500 ml beaker with bulbs of a Celsius thermometer & a Fahrenheit thermometer dipping in the water. Note the temperature in both at regular intervals fill the water boils.
10) What will happen of slice of bread is kept in open air for days together.
11) Food spoilage is due to __________________________
12) Pepper is usually adulterated with ________________
13) When do you get food poison?
14) What will happen if there is continuous trapping of solar energy by certain gases?
15) Find out the reason for rise in sea level.
16) What is the effect of exposure to high radiation to human being?
17) Do acid rain have detrimental effect on plants?
18) Interpret the reason for algal bloom.
19) Observe the food chain & comment Plants→ deer→ Tiger
20) Give a slogan for environment preservation.
21) Why some breeds of cattle need a lot of economic management?
22) Spread a sheet of paper on a table of sprinkle iron filings on it. Roll a bar magnet on it, what do you see?

23) S1←S2←S3←S4←S5 what type of heat transfer is this?
24) Hardness of water is due to ____________________.
25) Drop a small piece of sodium into a trough containing water. What do you observe?
26) In cities closer to oceans why does the temperature change gradually rather than suddenly, when the seasons change?
27) When water freezes it
   • Expands
   • Contracts
   • Evaporates.
28) Water that tastes salty ____________________.
29) Separate the substances that are soluble in water from these that are insoluble.
   Salt, wood , sugar, Alcohol, Kerosene, Wax, Oil, Milk, Sand, mercury, washing soda, Lemon Juice.

<table>
<thead>
<tr>
<th>Soluble in water</th>
<th>Insoluble</th>
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</tbody>
</table>
30) In the activities mentioned below, what method would you use to conserve water. Write your answer in empty box.

- Shower
- Bath tube

- Bathing

- Hose
- Bucket

- Cleaning your car

- Pan
- Pressure Cooker

- Boiling Vegetables

- Watering Can
- Garden sprinkler

- Watering Plants
31) Take a beaker keep some pieces of ice in it. After some time you will notice that small water drops form on the cold, outer walls of beaker. Do you know why these water drops are formed? What does it prove?

32) Decrease of gases like CO2 & CFC in the atmosphere may lead to the extreme heating of earth – say true or false.

33) It takes a longer time to boil a large pan of water than to boil a small pan of water say T/F.

34) What makes a popcorn seed pop when heated?

35) Why do doctors advise you to boil water before drinking?

36) What will happen if you boil equal amounts of water vegetable oil separately for the same length of time?

37) Why do substances such as butter, & Chocolate, Melt when kept outside the refrigeration during summers?

38) The process that heats the mug when hot coffee is poured into it____________________

39) Hot food starts losing heat as soon as it is removed from the fire because the temperature of the ________________is less than that of the food prepared.

40) Why do people prefer to wear light or white clothes during summer?
Reaction Scale

Read the questions and tick yes / sometimes / No.

1) Was there any scope for you to discuss with one another in the class
   yes /sometimes / No

2) Was there any observable change in the approach of teaching
   Yes/sometimes/ No

3) Were you able to ask questions to your teacher?
   yes/sometimes/ No.

4) Were you able to work out individually?
   yes /sometimes / No

5) Was there any chance for you to participate in teaching learning
   process
   yes /sometimes/ No

6) Was there any peer group discussion?
   yes /sometimes / No

7) Was there enough examples cited while explaining?
   yes /sometimes / No

8) Were you provided with resources to work out individually?
   yes /sometimes / No

9) Were you able to get prompt feed back.
   yes /sometimes / No

10) Was there any scope for mutual tutoring.
    yes /sometimes / No

11) Do the constructive lesson challenged students as address high
    level thinking.
    yes /sometimes / No

12) Did the teacher prompt the students to formulate their own
    questions.
    yes /sometimes / No

13) Did the teacher motivate the students to learn with interest.
    yes /sometimes / No

14) Did the teacher encourage students to explain concepts in their
    own words.
    yes /sometimes / No

15) Did the teacher allow the students to apply their skills.
    yes /sometimes / No

16) Did the teacher continuously observe the students.
    yes /sometimes / No
17) Did the teacher emphasize learning through meaning making process rather than memorization of concepts. 

   yes / sometimes / No

18) Were you able to get an opportunity in improving good relationship among the students with the teacher. 

   yes / sometimes / No

19) Was there enough time to think, plan, investigate and organize information during class hours? 

   Yes / sometimes / No

20) Did the teacher decide upon the alternative activity for those students who could not attain the required understanding? 

   Yes / sometimes / No
Descriptive Questions

I. Answer the following questions on your own.

1) What is your opinion about this approach?

2) What is the significance, relevance for facilitating the lesson in this way?

3) How do you feel about the learning experiences provided in constructivist classroom?

4) Have you got the freedom to express your ideas in the classroom?

5) What will be your suggestions to improve the teaching learning situation?

6) List few differences between your usual classroom of constructivistic classroom.

7) What are the procedures used by the teacher to evaluate your performances?

8) How was the learning environment in the constructivistic classroom?

9) Did you get enough resources to utilize?

10) Was there any behavioral change during this process?
Perception of Nature of Science Test.
Read each Statement and tick your options

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Traditional Belief</th>
<th>Agreed</th>
<th>Neutral / No Response</th>
<th>Agreed</th>
<th>Constructivist View</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Observation alone is sufficient</td>
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<td>Observation alone can't led to scientific knowledge in an inductivist way.</td>
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<tr>
<td>2</td>
<td>Scientific knowledge is developed when there is sufficient evidence to support a concept.</td>
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<td>Conclusive scientific knowledge results even when a notion is falsified.</td>
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<td>3</td>
<td>Scientific knowledge is initially obtained through direct observations or by performing experiments.</td>
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<td>Scientific knowledge is obtained using observation as well as through non-experimental techniques e.g. with imagination or creativity.</td>
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<tr>
<td>4</td>
<td>Scientific knowledge is developed through scientific procedures.</td>
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<td>Scientific knowledge can be developed using scientific as well as through non-scientific methods.</td>
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<tr>
<td>5</td>
<td>Scientific Knowledge is exact.</td>
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<td>Scientific knowledge is ever changing</td>
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<td>6</td>
<td>Scientific knowledge is absolute</td>
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<td>Scientific knowledge is always tentative and subject to change.</td>
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<td>7</td>
<td>Scientific knowledge gives reality</td>
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<td>Scientific knowledge is the present view which we consider reality.</td>
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<td>8</td>
<td>Scientific knowledge is cumulative</td>
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<td>Scientific knowledge is has been developed cumulatively as well as in jumps.</td>
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<td>9</td>
<td>Scientific theories are based on direct observations.</td>
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<td>Observations are based on scientific theories.</td>
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<td>10</td>
<td>Scientific theory is correct only when it is supported by direct experimental evidence.</td>
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<td>Besides direct evidence if supported by its connections to other accepted theories validates a new theory.</td>
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<td>11</td>
<td>Scientific theories are discovered when there is some experimental evidence.</td>
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<td>Scientific theory because of imagination or creativity may precede or follow an experimental evidence.</td>
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<tr>
<td>12</td>
<td>Scientific theories are based on empirical evidence.</td>
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<td>Scientific theories are developed with imagination or creativity.</td>
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<tr>
<td>13</td>
<td>Scientific theories proved to be wrong are outdated and of no use for scientific development.</td>
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<td>Scientific theories are applicable in specific situations and hence are helpful for further scientific development.</td>
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<td></td>
<td>Scientific theory based on a number of observations / cumulative evidences is not invalidated because a single observation does not fit with it.</td>
<td>Scientific theory is insufficient if falsified by a single observation / evidence.</td>
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<td>15</td>
<td>Scientific theories are accepted without difficulty at any point of time.</td>
<td>Scientific theories encounter criticism in the short term and are judged with respect to existing theories, range of observations and their effectiveness in predicting new findings in the long term.</td>
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<td>16</td>
<td>Scientific theories are always discovered first before its technological applications.</td>
<td>Scientific theory or technology, either of the two may precede the other.</td>
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<tr>
<td>17</td>
<td>Scientific theories are true universally.</td>
<td>Scientific theories work on certain paradigms and hence may not be applicable in all situations.</td>
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<td>18</td>
<td>Science is universal.</td>
<td>Science is based on paradigms.</td>
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<tr>
<td>19</td>
<td>Scientific laws are absolutely true.</td>
<td>Scientific laws are subject of scrutiny to look for exceptions.</td>
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<td>20</td>
<td>Scientific models are copies of reality.</td>
<td>Scientific models are human inventions to describe a concept / illustrative an object.</td>
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</tbody>
</table>
Science Opinion Survey

Read each statement, circle the letter that most closely matches your opinion of the statement. There are no right or wrong answers—we just want your opinion.

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Statements</th>
<th>I strongly agree</th>
<th>I agree</th>
<th>I am not sure</th>
<th>I disagree</th>
<th>I strongly disagree</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Science lessons are fun</td>
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<td>2</td>
<td>I would dislike being a scientific after I leave school</td>
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<td>3</td>
<td>I would like to take another science course</td>
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<td>4</td>
<td>I dislike science lessons</td>
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<td>5</td>
<td>When I leave school, I would like to work with people who make discoveries in science</td>
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<td>6</td>
<td>I will be glad when I am done taking science classes</td>
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<td>7</td>
<td>School should have more science lessons each week</td>
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<td>8</td>
<td>I would like a job in a science laboratory after I leave school</td>
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<td>9</td>
<td>I would like to learn more about science</td>
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<td>10</td>
<td>Science lessons bore me</td>
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<td>11</td>
<td>Working in a science laboratory would be an interesting way to earn living.</td>
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<td>12</td>
<td>I would be wasting my time if I took more science courses</td>
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<td>13</td>
<td>Science is one of the most interesting school subjects</td>
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<td>14</td>
<td>A career in science would be dull and boring</td>
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<td>I will miss taking science courses in the future</td>
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<td>16</td>
<td>Science lessons are a waste of time</td>
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<td>17</td>
<td>I would like to teach science when I leave school</td>
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<td>18</td>
<td>I do not want to take any more science classes</td>
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<td>19</td>
<td>I really enjoy going to science lessons</td>
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<td>20</td>
<td>A job as a scientist would be boring</td>
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<td>21</td>
<td>Additional science courses are not a waste of time</td>
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<td>22</td>
<td>The material covered in science lessons is uninteresting</td>
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<td>23</td>
<td>A job as a scientist would be interesting</td>
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<td>24</td>
<td>Science courses I take in the future will be boring</td>
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<td>25</td>
<td>I look forward to science lessons</td>
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<td>26</td>
<td>I would dislike becoming a scientist because it needs too much education</td>
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<td>27</td>
<td>Science classes I take in the future will be interesting</td>
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<td>28</td>
<td>I would enjoy school more if there were no science lessons</td>
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<td>29</td>
<td>I would like to be a scientist when I leave school</td>
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<td>30</td>
<td>I do not need to learn more science.</td>
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<td>31</td>
<td>Science class helps me to evaluate my own work</td>
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<td>32</td>
<td>Learning science helps me understand about the environment</td>
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<td>33</td>
<td>Emotion has no place in science</td>
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<td>34</td>
<td>Science helps me to judge other people's point of view</td>
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<td>35</td>
<td>Science will help me to understand more about world wide problems</td>
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<td>36</td>
<td>Science has nothing to do with my life outside of school</td>
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<td>37</td>
<td>Experiments in science help me to learn with a group.</td>
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<td>38</td>
<td>Science teaches me to think less clearly than I already do.</td>
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<td>39</td>
<td>Making a good decision is a scientific process</td>
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<td>40</td>
<td>Science has nothing to do with local issues, such as waste from nearby factories</td>
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<td>41</td>
<td>Science can help me make better decisions about what I buy.</td>
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<td>42</td>
<td>Science experiments can help me to better understand the world</td>
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<tr>
<td>43</td>
<td>I would like to learn more about strategies for thinking in my science class.</td>
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<td>44</td>
<td>Using scientific methods helps me make environmental decisions.</td>
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<tr>
<td>45</td>
<td>Collecting evidence is an important part of making decision.</td>
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<tr>
<td>46</td>
<td>Learning science enables me to explain my thoughts better to others.</td>
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<tr>
<td>47</td>
<td>Usually it is bad to have any feelings about the scientific issues I am considering.</td>
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<tr>
<td>48</td>
<td>I do not expect to use science much when I get out of school.</td>
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<tr>
<td>49</td>
<td>My intuition helps me make decisions in science.</td>
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<tr>
<td>50</td>
<td>Making decisions can be difficult when I don't understand the choices.</td>
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</tbody>
</table>
**TEST OF SCIENCE RELATED ATTITUDE**  
(TOSRA)  
**Section II**

Read each statement. Tick the options that closely matches.

<table>
<thead>
<tr>
<th>S.No</th>
<th>Statements</th>
<th>I strongly agree</th>
<th>I agree</th>
<th>I am not sure</th>
<th>I disagree</th>
<th>I strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Money spent on science is well worth spending.</td>
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<tr>
<td>2</td>
<td>Scientists usually like to go to their lab when they have a day off.</td>
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<td>3</td>
<td>I would prefer to find out why something happens by doing an experiment than by being told.</td>
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<td>4</td>
<td>I enjoy reading about things which disagree with my previous ideas.</td>
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<tr>
<td>5</td>
<td>Science lessons are fun.</td>
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<tr>
<td>6</td>
<td>I would like to belong to a science club.</td>
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<td>7</td>
<td>I would dislike being a scientist after I leave school.</td>
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<td>8</td>
<td>Science is man's worst enemy</td>
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<td>9</td>
<td>Scientists are less friendly than other people.</td>
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<tr>
<td>10</td>
<td>Doing experiments is not as good as finding out information from teacher.</td>
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<tr>
<td>11</td>
<td>I dislike science lessons.</td>
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<tr>
<td>12</td>
<td>I dislike repeating experiments to check that I get the same results.</td>
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<td>13</td>
<td>I would like to be given a science book or a piece of scientific equipment as a present.</td>
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<tr>
<td>14</td>
<td>A career in science would be dull and boring</td>
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<tr>
<td>15</td>
<td>Science can help to make the world a better place in the future.</td>
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<tr>
<td>16</td>
<td>I find it boring to hear about new ideas</td>
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<tr>
<td>17</td>
<td>I would prefer to do experiments than to read about them.</td>
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<tr>
<td>18</td>
<td>I am curious about the world in which we live</td>
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<tr>
<td>19</td>
<td>I would enjoy school more if there were no science lessons.</td>
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<tr>
<td>20</td>
<td>I dislike reading newspaper articles about science</td>
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<tr>
<td>21</td>
<td>I would like to teach science when I leave school</td>
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<tr>
<td>22</td>
<td>The material covered in science lessons is uninteresting.</td>
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</tbody>
</table>
Raven progressive matrices test

CHOOSE ANY ONE OPTION

1

1 2 3 4 5 6
21

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