# BIOTECHNO ACTIVITY BOOK

**CLASS - IV**

Price : Rs. 60



First published : January 2008

Published by : Eduheal Foundation, 103, Ground Floor, Taj Apartment, Near VMMC & Safdarjung Hospital, New Delhi-110029, Telefax : 011-26161014.

e.mail: eduhealfoundation@gmail.com, website: www.eduhealfoundation.org

EDUHEAL FOUNDATION
• LEARNING FOR LIFE •

**Enhancing awareness & knowledge in children about BIOTECH**

EDUHEAL FOUNDATION
• LEARNING FOR LIFE •
103, Taj Apartment, Ground Floor, Ring Road, Near Safdarjung Hospital, New Delhi - 29.
Ph: 011-26161014, website : www.eduhealfoundation.org, e-mail : info@eduhealfoundation.org

## Preface

Biotechno Activity Book is a small step towards encouraging school students to take up Biotechnology. These activity books, meant for free distribution to students enrolled for Nationwide Biotechnology Olympiad (NBtO) will help students generaling interest for Biotechnology. We at EduHeal Foundation still need a lot of help and encouragement from school teachers and Principal in accomplishment of our goal. It is you, who form the vital link between EduHeal Foundation and students as you can further encourage students to know about Biotechnology on a day to day basis. We will also not sit idle but make all possible efforts to increase interest :

- By publishing books like Biotechno Activity Book.
- Create awareness by conducting Nationwide Biotechnology Olympiad.
- Teacher Training Programme in pure and applied sciences.
- Career Development Workshop for Students.
- **Online course management system** so as to provide an affordable platform to schools for online teaching and testing.
- Networking to enhance school/Govt./ Industry Interface.

**EDUHEAL FOUNDATION wishes to thank the following for their support**

* EduSys Subject Experts
* **Mr. Ram Mohan Rao**
  Former Principal Information officer, Govt. of India.
  Former Information advisor to the Prime Minister
* **Prof. S.S. Mathur**
  Former Prof. & Head,
  Centre for Energy Studies, IIT Delhi
* **Dr. Saroj Mishra**
  Prof. of Biotechnology, IIT, Delhi
* **Dr. A.N. Sinha**
  MS, FAIS, FICS
  Former Consultant Surgeon & Head,
  Safdarjung Hospital , Delhi
* **Dr. Dinkar Bakshi**
  MD Registrar, Deptt. of Paediatrics,
  Infirmary Hospital, Leeds, U.K
* **Dr. Sandeep Dham**
  MD (Medicine),
  Clinical Astt. Prof.,
  SUNY Health Centre, Broklyn, New York, USA
* **Dr Hemant Shukla**
  MD, (AIIMS) Delhi
* **Dr. Rajesh Kaushal**
  MD (AIIMS) Delhi
* **Dr. N.K. Mendiratta**
  DA, Anaesthesia
  Safdarjung Hospital, Delhi
* **Dr. Nagendra P.**
  MS (Orthopedics)
  Bangalore Medical College, Bangalore
* **Dr. K. Sharma**
  Dept. of Biotechnology, AIIMS, Delhi

For any query please contact Eduheal Foundation helpline : 09350232518, 011-26168623

With best wishes

**Dr. Sandeep Ahlawat**
Managing Director
Eduheal Foundation

# CLASS - IV

# SYLLABUS GUIDELINES

(based on National Curriculum frame work issued by NCERT)

## CLASS - IV

| Questions | Key concepts | Activities/ Processes |
|---|---|---|
| **1. FAMILY AND FRIENDS**<br>**1.1 Relationships**<br>***Your mother as a child***<br>When your mother was your age who were the relatives she lived with?<br>***Where do babies come from?***<br>Have you seen a newborn baby - where did she come from? Where does the puppy/ kitten/ calf/ chick come from? Do you know of people who are looking after/ have adopted a child? | Change with time in people residing together. Family tree today.<br><br>From the mother's body; mother-child relationship; Foster parents and adoption | Asking questions from mother about her childhood.<br><br>Story telling and discussion. |
| ***My extended family***<br>Are there things you learn from your family members? What? Do you do anything different from other members of your family? Do all your family members live with you all the time? When do<br>you meet members of your family who do not live with you? What festivals do you celebrate<br>together? | Family as a microcosm;<br>(Family values – gender, earning capacity, decision making, caste, religion perceptions etc.); changes in family value system – lead to changes in society;Festivals and family gatherings | Discussion on family values, habits within family; discussion on family occasions. |
| ***Feeling around with eyes shut***<br>With your eyes and ears closed can you identify the people/animals living with you merely by<br>touching/smelling? By touching can you tell if anything is cold/hot, wet/ dry, smooth/ rough, sticky/slippery, soft/hard? Are there some things which you are not allowed to touch? Do you feel uncomfortable when some people touch you? | Sensitivity to people who are differently abled; Senses of smell and touch;, emotional response to a caress/slap; 'good' and 'bad' touch. | Guessing game: Group activity where children touch different things with their eyes shut. |
| **1. 2 Work and play**<br>*Fun and fights at play!* Do you play the same games at school that you play at home? What things do you use to play with? Does the school provide these? Do you fight while you play? How do you decide the rules for the games? Does anyone stop you from playing? Who and why? Do you play with every child (boys and girls) in your neighbourhood? Are you stopped from playing with certain children? | Different games at home and school.<br>Play as a way of social negotiation; rules of each game; fights and the need to negotiate – ideas of fair play.<br>Restrictions on play; playmates from children of different gender or class/caste backgrounds. | Discussing and planning rules for local games and playing together in groups; writing them down. |

| | | |
|---|---|---|
| ***How they learnt their skills***<br>In your area do you know the people who do the following: make pots/stitch clothes/ make shoes/cure people/ build bridges/ embroider/fly planes/ repair cycles/ drive buses, etc? How well do you know them – their names, family etc? What tools do they use for their work?<br>Where did they learn how to do these things? | Different occupations in the local region/ country; who does what work. Gender and work. | Drawing people with their professional tools; talking to some people and describe how they learnt their skills |
| ***Fun at the fair/Circus***<br>Have you been to a fair or a circus? Which is the item you liked best – was it a ride, a game, something you saw/ate/bought? When do you fly kites?<br>How do you make them fly? | Ways of recreation. | Kite-making and kiteflying activity in groups, making tops, writing a paragraph about an experience in a fair/circus. |
| **1.3 Animals**<br>***Animals and their friends***<br>Which animals like to move around in groups? Which animals are shy and do not come near you? Have you seen animals playing with or riding on<br>different animals? | Herds; group behaviour; animal-human intreraction. | Observation of flowers and the insects that visit them, drawing the flowers, insects,; discussion on colour, fragrance. |
| ***Who is attracted to flowers?***<br>Why do bees/butterflies come to flowers? How do people collect the honey from bee hives? | Honey from flowers; bee hive and basic idea of honey collection. | Listing and classification of animals with and without ears; with and without hair; drawing them; feeling them. |
| ***Long ears or short?***<br>Which animals have ears? Which animals have hair on their body? | Some animals have external ears. They also have hair. | |
| **1.4 PLANTS**<br>***Roots of plants***<br>Do all plants need water to grow? Which part of the plant absorbs water from the soil? When you tug at grass, why does it not come out easily? Why do plants/trees not get uprooted when there is a strong wind? Which roots are eaten by people during famine when nothing else grows? | Plants need water; roots absorb water and hold it to the ground.<br>Roots eaten normally by people like carrots, radish, sweet potato, and during famine.<br>Aerial roots of some plants | Observation, collection, drawing of roots of different types,<br>Observing trees/plants whose roots are affected by activities like construction/ paving/ plastering.<br>Observation and discussion about swinging on *pipal/bargad* aerial roots. |
| ***Flowers***<br>Which plants around us have flowers? Do they come only at some times of the year? How is the bud different from the flower? What are the different kinds of flowers we have seen – shapes, colours, petals, aroma, etc? What do we use flowers for? Do you eat any flower? Have you seen flowers motif painted on clothes, walls, floors, pots, animals?<br>Who sells flowers in our area? Where do these come from? How are flowers sold - for how much? | Flowering plants; seasons; observation of buds blossoming into flowers; different shapes, colours, petals, aroma, etc.Flowers used in everyday life, festivals, etc. Floral motifs and designs on clothes, animals, pots, walls, etc.<br>Knowing the local flower seller; some idea of the local unit of measurement (by cubit, fixed garland, each stem, etc.) and cost. | Drawing flower motifs for clothes, animals, pots, etc. Making floral decorations; Observing the flowers and buds, noting similarities and differences; observing /smelling and feeling different flowers. |

| | | |
|---|---|---|
| ***Whom do trees belong to?***<br>Which plants/trees around you are looked after by people – by whom? Which are not? Whom do they belong to? Who eats the fruit of trees that grow wild? | Neighbourhood and its plants; wild and domestic plants;<br>Fruits eaten by people living in forests.<br>Cutting trees. | Listing of some common trees in the neighbourhood; discussion about ownership of trees; fruits that are not eaten by us. |
| **2. FOOD**<br>***How we get our food***<br>How does food reach us? Who grows it? How you seen vegetables and fruits growing? How you seen plants of rice/ wheat/ dal etc? What are the spices do you know? Which spices can we recognize by smelling or tasting. | From field to *mandi* - from market to house; grown by farmers; fruit trees, vegetables, cereals, pulses, oil seeds;<br>Spices<br>*How can we improve our food material using biotechnology* | Listing plants children know that provide them food; bringing samples; common spices, observing and drawing samples, recognizing them by smell and taste. |
| ***Special occasions***<br>When do many people eat together? What food is eaten? Who cooks it? How is it served?<br>Does you get a mid day meal meal in school? - What items? Who provides the mid day meal? | Community eating; Mid day meal (where applicable).<br>Cultural diversity in foods associated with special occasions like festivals, family celebrations/ ceremonies etc. Boarding school. | Discussion on occasions at which there is community eating; Listing of the different foods eaten at different occasions; drawing and descriptions of the large utensil used on such occassions |
| ***Tongue and Teeth***<br>How do we taste different foods? How do teeth help us to eat – are all teeth similar? Which teeth have I dropped and how are the new ones different? | Taste, tongue; teeth – types, milk teeth, permanent teeth.<br>Tongue and speech. | Observation of each other's teeth, tongue and mouth; counting teeth; drawing; experiments with different tasting items. |
| ***Teeth, beaks and claws***<br>Are the teeth of other animals similar to ours? Can we tell what birds eat by looking at their beaks? Are the claws of birds also different? Is their shape related to the food they eat? | Teeth in some common animals; beaks and claws of birds – relationship with food they eat. | Observation and drawings of beaks, claws and teeth of different animals, birds, etc. |
| **3. SHELTER**<br>***Houses then and now***<br>Do you live in houses similar to ones your grandparents lived in ? Are houses now made of similar materials as was used then? What are the differences? | House change over time; rural and urban differences, multi-storeyed houses along with slums in cities.Materials used have changed. | Making models of houses; collection of materials used to make houses. Drawing pictures of old and new buildings. |
| ***Garbage?***<br>What do you do with waste in your house? Where do you throw it? Do you reuse any waste materials? Who takes away the garbage? | Waste materials, waste in our houses, urban/rural waste.<br>Reduce garbage. | Listing things thrown away as garbage, waste. Discussion on reduction of waste. |
| ***Where animals live***<br>Do animals live in shelters? Which animals live in water? On land? Underground? Are there any animals that we see only at night? Where do they go during the day? Do we know of animals that make their own shelter? | Diversity in animal habitat and shelters.<br>Some structures like webs have other purposes. | Discussion, listing of animals with respect to their habitat and shelter.; making birds nests with scrap materials, making caves, rat holes etc in mud/sand pits. |

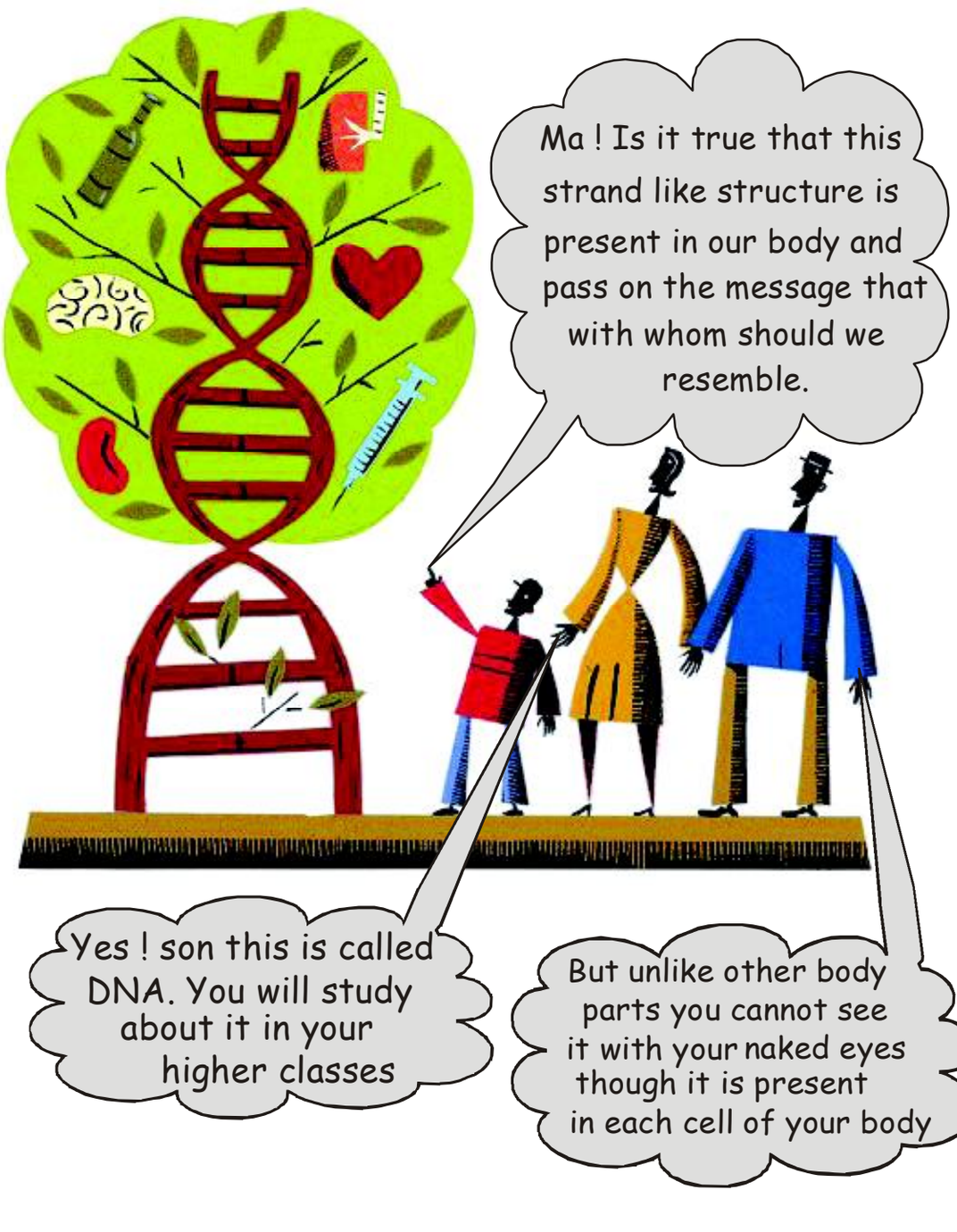
| | | |
|---|---|---|
| ***When birds make nests***<br>When and why do birds make their shelter? Do all birds make nests? Where do different birds nest - when do they fly away?<br>With what different materials do birds make their nests? | Birds make nests for laying eggs. Nesting habits of different birds vary. Different materials are used for nests. | Discussion, listing of animals with respect to their habitat and shelter.; making birds nests with scrap materials, making caves, rat holes etc in mud/sand pits. |
| ***Mapping our neighbourhood***<br>Who are my neighbors? Do I have any of the following near my house – a school, grocery shop, market, well, river or pond? Where are they with respect to your house? | Introduction to the concept of givingin directions with respect to any landmark; also a preliminary mapping process, further use of use of symbols, use of a scale. | Observation of a bird's nest and drawing pictures. Songs and poems; dance and movement to simulate bird flight. |
| **4. WATER**<br>***Water fit for drinking***<br>What are the major natural sources of water in your area? Is the water fit for drinking – do you clean it at home? Do you know how dirty water can make<br>you ill? Why do we not drink seawater? How is salt separated from seawater? | Natural sources; inland water and sea water; potable water; diarrhoea and other common water borne diseases, safe handling of water, purification of water. | Discussion, enquiry from friends and counting number of steps and stimation of distance for making a preliminary map. |
| ***Water sources***<br>Where do you see large amounts of water in your neighborhood? Is it a tank/pond/canal/ river/ dam? What do men/ w o m e n / c h i l d r e n / animals do with the water there? Is it used for bathing/washing? Who bathes/ washes there and who does not? How can we ensure that this water is not made dirty? | Reservoirs, canals, dams etc.; Different public activities at water bodies; protection of water bodies.<br>Water as a scarce resource and the struggle for acquiring it (those who can exploit resources by digging deeper and deeper wells). | Discussion with the elders/health personnel about pollution of natural sources of water and its effects; demonstration/ group activity of simple methods of water purification; seperation of salt from saline water. |
| Do you find factories/ people dumping garbage or harmful materials rivers or seas? Are some animals also facing problems due to what we do to the rivers or seas? | Rivers and seas; seasonal change in water flow; animals in the sea/river. Water pollution and harmful effects on animals. | Visit to the natural sources of water in the local area and observing what uses the water is put to. Discussion, and writing letters/making posters highlighting the misuse of the water body. |
| ***Our river/sea***<br>Which is the river closest to our locality? Do we find any change in the water flow in different seasons? Which are the big rivers we know of? Have you seen the sea? Which are the animals found in the sea/river? | Basic processes of evaporation and condensation<br>*How can we clean rivers using Microbes* | Drawing/Painting/Make a model of a water body in the neighbourhood (using scrap materials) as well as the animals found in the river/sea. |
| ***Water vanishes when heated?***<br>Why do puddles dry? In which season do wet clothes dry easily? When do they dry with difficulty?<br>Have you seen and wondered where water droplets on the outside of a cold glass of water came from? | Use of animals for transport; sensitivity towards animals. | Activity on water drying up from a wet cloth or dish of water in different conditions such as sunlight and shade. |

| | | |
|---|---|---|
| **5. TRAVEL**<br>***Animals for transport***<br>Have you traveled on a tonga / horse carriage? How is it different from travelling on a bus? Are the horses well looked after? Have you seen a horseshoe? Why is it used? What materials have you seen being transported using animals? Are there any special occasions when you ride on animals? | Use of animals for transport; sensitivity towards animals. | Enacting instances of animals used for transport and people riding them. |
| ***Paying for travel***<br>How do pay for our travel by train/bus/boat etc? Who issues/checks the bus /rail ticket? Which currency notes and coins have you seen? Pictures of which animals can we see on a ten rupee note? Which symbol is found on every coin? How many scripts can you recognise on a note? Who is the person whose face is shown on every currency note? What coins/notes did our grandparents use when they were young? | Familiarity with currency notes and coins, national symbols, recognizing some language scripts; Introduction to Mahatma Gandhi Old coins, change. | Enactment of a bus journey. Comparison of coins and currency notes; /Tracing of coins.<br>Designing a school emblem/logo. |
| ***Travel to another place***<br>Do you know anyone who has traveled very far from your village/city? Why did they go so far? What are they doing there?<br>How do they travel when they visit your family? | Different land forms, languages, clothing, food habits, some idea of another country (only through a story/imaginary narrative). | Reading and listening, discussion, writing about a traveling experience of oneself or visiting relatives. |
| **6. Things We Make And Do**<br>***Building materials and tools***<br>How are bricks made? What tools have you seen being used for making a wall or a house? Is there a bridge to cross while coming to school? What kinds of bridges have we seen and where? How many kinds of bridges can we make? | Process of making involves raw materials, tools, labour, energy– changes over time in these and in environment too.<br>Materials and tools used for construction; Different skills of people at engaged in a construction activity. | Making bricks; drawing and talking about different tools.<br>Observing, drawing and describing different bridges and how people make their own local bridges from ropes, bamboo and logs of wood.<br>Making toy bridges in school. |

# EVERYDAY BIOTECHNOLOGY



# DNA TREE


Ma ! Is it true that this strand like structure is present in our body and pass on the message that with whom should we resemble.
Yes ! son this is called DNA. You will study about it in your higher classes
But unlike other body parts you cannot see it with your naked eyes though it is present in each cell of your body

# DO THE DNA TWIST

What do a person, a daisy, a fish, and a beetle have in common?

They're all made of cells! That's right even YOU are made of trillions of tiny cells.

But if all living things are made of cells, what makes each one unique? You're different from a snail, a tree, and even your best friend because of your DNA, which is found in every cell in your body. You can't see DNA's structure (even with a powerful microscope), but you'll make a model of it in this activity.

## What you'll need :

- ☺ Some colored paper (thicker paper is better)
- ☺ Scissors
- ☺ Pencil
- ☺ A box of toothpicks (not the colored ones)
- ☺ Magic markers
- ☺ A ruler
- ☺ String or masking tape

**SAFETY TIPS**

- ☺ Toothpicks can be very sharp, so be careful poking those holes!
- ☺ As you poke each toothpick through the paper, keep your fingers away from the hole.

1 First, make the sides of the ladder. To do this, cut two strips of colored paper that are at least two feet long and about one inch wide. (If your paper's not long enough, tape a couple of strips together.)

2 Use a pencil and a ruler to mark each inch along one strip.

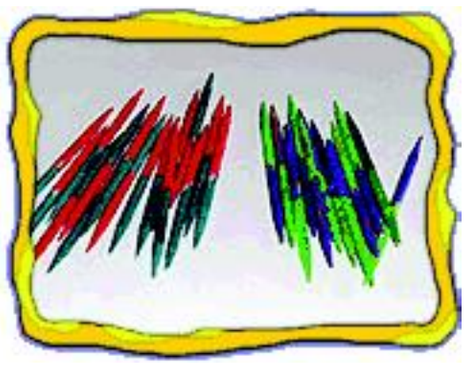
3 Next, make the steps or rungs of the ladder. In DNA, these steps are made of four bases adenine (A), thymine (T), cytosine (C), and guanine (G). Choose four colors from your markers to represent the four bases. Write the colors

you choose for each base here :

A : _____ T : _____

C : _____ G : _____

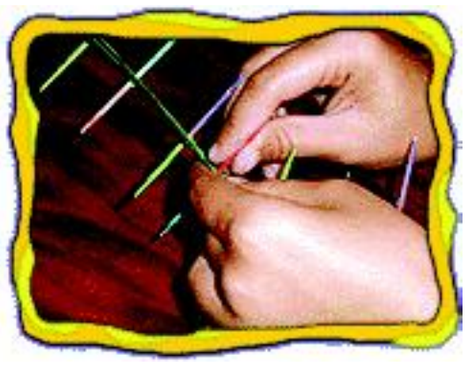
4 Take 10 toothpicks. For each one, color half the toothpick the color you chose for A. Color the other half the color you chose for T. Take ten more toothpicks and do the same thing with the colors you chose for C and G. (It's important that A is always paired with T and C is always paired with G.)



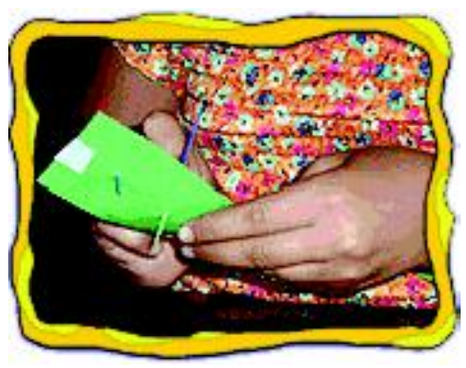
5 Now construct your double helix! Grab both strips of paper, put one on top of the other, and tape them together at each end.

6 Using the pencil marks as a guide, poke a toothpick through the middle of the strips at every inch. You can add toothpicks in any order you want.

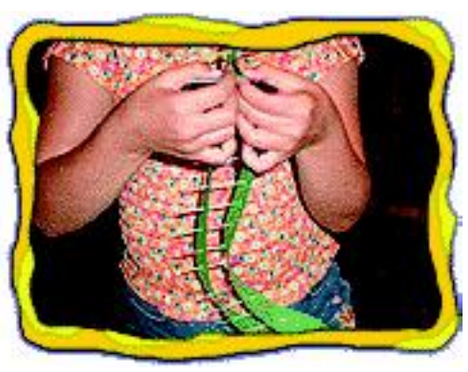
7 Keep going until your strips are filled up. Be sure to leave some room at the ends of the strips. Make sure all the toothpicks are pushed halfway through the holes.



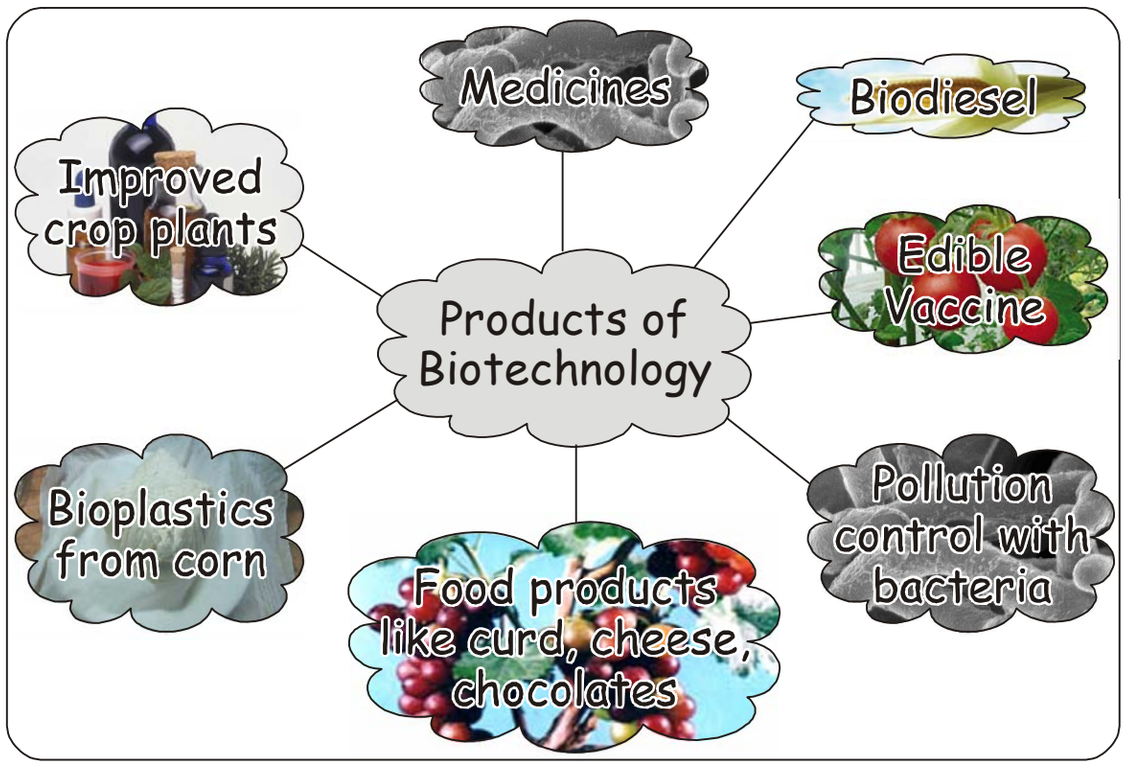
8 Gently spread the two strips apart until your model looks like a ladder. This is what DNA would look like if it weren't twisted. (Hint: If any toothpicks fall out, put a drop of glue on the hole, stick the toothpick back in, and let the glue dry. You could also wrap a piece of tape around the toothpick.)



9 Now for the twist: Tape one end of your model to a wall or wherever you want to hang your DNA model. (Make sure the place you choose is okay with your parents.)



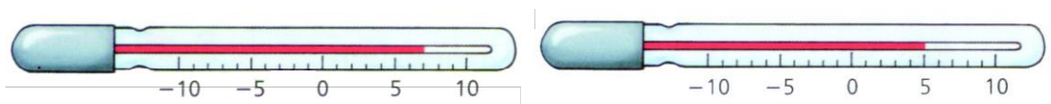
10 Then, carefully holding the DNA model, twist it at least once around until it looks like a double spiral. Tape the other end to a flat surface. Congratulations - you've done the DNA twist!



## SAMPLE PAPER

### MENTAL ABILITY

**1.** Thursday Friday




What is the temperature on Friday.

(a) 2°C (b) 5°C (c) 7°C (d) none of these

**2.** $\frac{1}{2}=\frac{\square}{6}=\frac{\square}{12}$ . Fill the blanks.

(a) 1, 1 (b) 3, 6 (c) 3, 4 (d) none of these

**3.** What would you do to 6 to change it to 19 ?

(a) add 12 (b) add 13

(c) minus 6 (d) none of these

**4.** Pooja drank 285 ml of juice from a 1000 ml carton. How much juice is left?

(a) 215 ml (b) 715 ml

(c) 285 ml (d) none of these

**5.** Write 567 cm as meters.

(a) 567 m (b) 670 m

(c) 5.67 m (d) none of these

### SCIENCE

**6.** We can walk on snow by wearing skating pads because

(a) they act as legs
(b) the pads can move on snow
(c) they have blades which melt the snow below it
(d) none of these

**7.** The animal that gives birth to babies is
(a) cow (b) frog (c) hen (d) none of these

**8.** Which animal you can not find now a days?

(a) 

(b) 

(c) 

(d) none of these

**9.** Water exists in
(a) two forms (b) three forms
(c) one form (d) none of these

**10.** Sheeps have long hairs on their body. What is the purpose of long hairs?
(a) long hairs give them beauty
(b) long hairs made wool.
(c) long hair (wool) stops loss of heat from the body
(d) none of these.

**11.** How water plants are able to float in water?
(a) they have air spaces
(b) leaves help them to float

(c) flowers help them to float
(d) none of these

**12.** What is prepared from flowers?

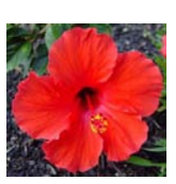
(a) juice (b) sweet
(c) scent (d) none of these

**13.** Plants are grown in

(a) market (b) shop
(c) nurseries (d) none of these

**14.** Why these flowers have different colours ?



(a) butterfly coloured them
(b) God poured different colours on flowers
(c) they have pigments
(d) none of these

**15.** We can not drink sea water because

(a) it is salty (b) it is tasteless
(c) it has no colour (d) none of these

**16.** Find the odd one.

(a)  (b)  (c)  (d) 

17. Who can make their own food ?
(a) mother (b) father (c) plant (d) animal

18. What appears on the bottle that you take out of the refrigerator?
(a) water drops (b) jam (c) cool air (d) fog

19.   

What will happen if more and more smoke is released from these vehicles ?
(a) No change (b) mosquitoes go away
(c) air becomes bad
(d) we can not see the things properly

20. You know that some animals live in water and some on land.
Name the animal that lives both on land and water.
(a) fish (b) cow (c) frog (d) snake

## BIOTECHNOLOGY

21. How can we re-use the bad river water
(a) boiling the water in houses
(b) cleaning the water in treatment plants
(c) filtering the water with cloth
(d) none of these

**22.** Cheese is made by a process called.
(a) evaporation (b) fermentation
(c) sublimation (d) none of these

**23.** Your father planted cotton seeds in the farm. The plants begin to grow. But suddenly all of them died. For the next year your father wants to solve the problem. He will
(a) buy (pesticide)s for plants
(b) buy healthy seeds from the shop
(c) he would look after the plants day and night
(d) none of these

**24.** What is BCG ?
(a) a TV programme (b) name of a vaccine
(c) name of a computer centre
(d) none of these

**25.** A, C, G and T live in a colony. A–T and C–G are good friends. A gives two apples whenever he meets T and C gives three apples to G on each meeting.

| Meeting | Monday | Tuesday |
|---|---|---|
| A – T | 3 times | 2 times |
| C – G | 2 times | 4 times |

How many apples does G get on tuesday.
(a) 6 (b) 4 (c) 12 (d) none of these

## ANSWERS

| | | | | |
|---|---|---|---|---|
| **1.** (b) | **2.** (b) | **3.** (b) | **4.** (b) | **5.** (c) |
| **6.** (c) | **7.** (a) | **8.** (a) | **9.** (b) | **10.** (c) |
| **11.** (a) | **12.** (c) | **13.** (c) | **14.** (c) | **15.** (a) |
| **16.** (c) | **17.** (c) | **18.** (a) | **19.** (c) | **20.** (c) |
| **21.** (b) | **22.** (b) | **23.** (b) | **24.** (b) | **25.** (c) |