

Sadiq Public School



Distance Learning for I1

August-September 2020



Sadiq Public School

Do the right, fear no man

Distance Learning

July, 2020

Dear students and parents,

Assalam o aleikum.

Inshallah all of our students and their families are staying home, staying safe, and protecting themselves and their communities in this most unusual situation. We understand as well as anyone how difficult it is to be living in such a situation. If we all follow the government's very simple guidance the situation will improve very soon, as it has in many countries around the world, and our lives can get back to normal.

The Government has announced that Schools will likely be allowed to re-open on September 15th, 2020. Let me be clear – Sadiq Public School is planning for a full school year from September 15th 2020, i.e. with the appropriate number of school days to ensure our students complete their normal syllabuses well in time for their annual examinations without compromising too much on the remainder of our unique, holistic curriculum that includes sports, clubs, and community service – and self-discipline (doing the right thing at the right time).

After a considerable amount of thought and planning, after considering the many factors associated with distance learning including health and safety risks to children of being online for too long and unsupervised, costs of technology/devices/software, and the expected/likely outcomes, we have decided to offer a package of distance learning activities for students to do some school work. These activities are NOT intended to replace in-school, teacher-student learning activities and they are NOT compulsory for students to complete. The team of education experts at Sadiq Public School very strongly believe that education, i.e. meaningful learning, happens best when teachers and students interact, face to face, spontaneously.

This booklet has been prepared by a small team of subject teachers with help from the IT Department's staff. I am very grateful for their efforts!!

We also understand that the Sadiq Public School family is very diverse and what will work well for a K2 student living in Bahawalpur probably will not for a K2 student living in Quetta or a P6 student living in

Karachi. This is a self-contained, age-specific package of learning material prepared by SPS teachers for SPS students. You will not need to use the internet and you will not need textbooks or any other material except a normal, lined school notes book (a separate one for each subject) which you will bring back to school when lessons resume. We decided to create an e-booklet so it can be published and distributed to students and parents without needing to be printed and sent by post/courier out of concern for our environment. (There is an interesting hypothesis that the coronavirus outbreak is due to deforestation.)

Everyone's health is the top concern right now. Learning some mathematics right now is less important than protecting your health and your family's health. Not just your physical health, but also your mental health. We understand that these last few and next few months have been and will be difficult. It is very normal for everyone to be feeling worried and anxious. In such times, it is important to recognise your anxiety, understand what is causing it, and learn how to manage it by being kind to yourself, patient with others, eating well, sleeping well, doing some physical activity (there's a whole section about this later in the booklet), and trying to maintain a positive outlook. The virus outbreak will pass. We will all return to our normal lives. Inshallah!

Be happy. Not because everything is good, but because you can see some good in everything.

Yours Sincerely,

Mr Peter Giddens

Principal

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How to achieve academic success at Sadiq Public School

Our approach to teaching and learning is based on the knowledge that learning only occurs when cognitive effort is generated to the extent that information is made into a long-term memory that can be readily recalled. We use traditional teaching methods informed by current research in education and pedagogical practices.

The Sadiq Public School approach is based on:

1. Teachers impart knowledge and skills using a variety of media – talking/lecturing, written notes and diagrams on a whiteboard, demonstrations, initiating practical activities for students to experience what is being learnt.
2. All lessons are taught on the assumption that as the course unfolds, students are creating their own class notes.
3. Students use one standard textbook for each subject; the book recommended by the School. Students possess and use one lined or gridded copy book per subject, into which class notes are created. (Thinner books with less pages are preferable, to minimise the weight being carried from lesson to lesson. If students require, additional copy books should be used – but always a separate book for separate subjects.
4. A student's class notes are created from a combination of teacher-guided media and student-created media.
5. The class notes should replicate/mirror the course outline and the textbook chapter headings so that students can clearly see that their class notes match the course and the examination.
6. Teachers will show students how to use note-taking/making techniques such as underlining, using different colours, diagrams, lists, boxes, etc.
7. In general, the first half of the copy book is for class notes and the second half, indicated with some form of marker is for practice activities, e.g. homework tasks, the questions at the end of a textbook chapter, etc.
8. Students MUST keep a complete and neatly presented set of class notes. If a student misses a lesson, it is his/her responsibility to add in missed work. This may be done by copying another student's copy book.
9. Frequently, teachers will check students' copy books for completion, neatness,

accuracy, etc., and to write personalised / individualised feedback to students.

10. Occasional paper handouts may be trimmed and pasted neatly into a copy book, but this should be kept to a minimum because the act of writing/drawing the class notes into the copy book is the student's first step in learning the material being taught by the teacher. Pasting handouts into copy books teaches students how to use a glue stick and scissors; it does not teach a student anything about the material on the handout.

Writing class notes is the basis of our teaching and learning – but of course this is supported by other experiences such as demonstrations, practical activities, etc.

Examination preparation

In the weeks before examinations, students would typically use the class notes and text book to create a set of study notes by re-writing, often in short-hand/note form, using diagrams and mnemonics etc. Doing this reinforces and consolidates the student's class notes. Students would also complete the questions at the end of each chapter on their own. They would attend lessons and, under the teacher's supervision, complete individual exam questions from past papers, in such a way that the teacher 'unpacks' a question, clarifies the demands of the question, and students and teacher collectively create 'perfect' exam answers – all of which models how a student would take an examination, i.e. read the question, unpack the requirements of the question, clarify key terms/vocabulary in the question, pause, think, plan an answer, and then write an answer.

If you can, now is a good time to buy and prepare your notes books for each subject, ready for when you return to school.

You can use these notes books to write your answers/essays/responses to the activities in this booklet.

1. English Language

1. Read a novel (fiction) and
 - Write a synopsis (one-paragraph summary of each chapter's plot),
 - Write a review, who do you recommend it to?
 - Record all the words/idioms/phrasal verbs with their meanings/synonyms in your own booklet/notebook which you find new/ difficult in the book.

2. Use dictionary to find meanings of the following pair of words and use them in sentences also.

Abolish, Demolish; Allusion, Illusion; Assent, Ascent; Cannon, Canon; Cease, Seize; Cite, Site; Clamant, Claimant; Complement, Compliment; Confidant, Confident; Corps, Corpse; Deprecate, depreciate; Desert, Dessert; Discover, Invent; Dissent, Descent; Elicit, Illicit; Eligible, Illegible; Fain, Feign; Fetch, Bring; Farther, Further; Imminent, Eminent; Medal, Meddle; Persecute, Prosecute; Veracity, Voracity

3. Write a letter to someone thanking her or him for what she or he did for the safety of the people during the Covid-19 outbreak.
4. Write a personal account of life during Covid-19 enforced lockdown. Describe your feelings. How were you affected by the outbreak and the resulting changes to your life?
5. Write a fictional story with a moral (message) and the characters will be a mongoose, an eagle, and a squirrel.
6. Some people have been complaining that school has been closed for so long – but one day you will be able to tell stories to people about the time you had the longest summer vacation EVER!! What have been the highlights – what will you remember about this time 20 years from now?
7. Write a travel article for a magazine or newspaper about somewhere you have visited in Pakistan. Travel articles are always informative and positive and enthusiastic, aiming to encourage others to visit the place being written about. They usually include information about how to get there, where to stay, what special things can be done or seen there and usually something interesting about the people there. Here are some possible places: Taxila, Mangala Dam, Tharparkar Desert, Cholistan Desert, Lake Khanpur, Lahore's Shalimar Gardens, the Wagha Border Crossing, Bahawalpur, Karachi, Bumburet Valley, the top of Tirich Mir...

2. Urdu Language

- 1- چیئرمین بورڈ کے نام درخواست لکھ کر اپنی میٹرک کی سند کے اجراء کی استدعا کریں۔
- 2- آپ نے مکان فروخت کیا ہے اور اس کی تمام رقم وصول کر لی ہے۔ اس رقم کی وصولی کی رسید لکھیں۔
- 3- لاک ڈاؤن کے دوران آپ نے متعدد فلمیں دیکھی ہوں گی۔ اپنی پسندیدہ فلم کا خلاصہ تحریر کریں اور اس کی پسندیدگی کی وجہ بھی تحریر کریں۔
- 4- ان چھٹیوں کے دوران آپ کے کیا مشاغل رہے ہیں؟ اس حوالے سے اپنے دوست کے ساتھ پیش آنے والا مکالمہ تحریر کریں۔
- 5- ٹرین کے سفر کے دوران اچانک انجن فیل ہو جانے کی وجہ سے آپ کی ٹرین کو ویرانے میں کئی گھنٹے رکننا پڑا۔ اس ناخوشگوار واقعے کی روداد تحریر کریں۔
- 6- مختلف اخبارات میں شائع ہونے والے اردو آرٹیکلز میں سے کوئی سے تین آرٹیکلز کا خلاصہ اپنے الفاظ میں تحریر کریں۔
- 7- مختلف اردو اخبارات اور رسائل سے پانچ آرٹیکلز منتخب کریں۔ اور ان کی تلخیص کریں اور مناسب عنوان بھی تجویز کریں۔
- 8- موسمی تبدیلیوں اور ٹڈی دل کے حملے کی وجہ سے پریشان دو کاشتکاروں کے درمیان مکالمہ تحریر کریں۔
- 9- عید الاضحیٰ کے بعد آپ کے محلے یا کالونی میں قربانی کی آلائشوں اور غلاظت کا ڈھیر لگا ہے جس کی وجہ سے اہل علاقہ کا گزرنا محال ہو گیا ہے۔ اس صورت حال کی بہتری اور صفائی کے مناسب انتظامات کرنے کے لیے میئر میونسپل کارپوریشن کے نام درخواست تحریر کریں۔
- 10- آپ نے ان چھٹیوں میں جو اردو کتابیں پڑھی ہیں، ان کی تفصیلات کی روداد (رپورٹ) تحریر کریں۔

3. Mathematics

Chapter 01: Number system

- **Rational number:**

A number which can be written in the form of p/q , where $p, q \in \mathbb{Z}$, $q \neq 0$, is called a Rational number.

- **Irrational number:**

A real number which cannot be written in the form of p/q , where $p, q \in \mathbb{Z}$, $q \neq 0$, is called an Irrational number.

- **Real number:**

The field of all rational and irrational numbers is called the Real numbers, or simply the “Reals,” and denoted by \mathbb{R} .

- **Terminating decimal:**

A decimal which has only finite number of digits in its decimal part is called Terminating decimal. e.g. 2.3456 and 21.13474 are examples of terminating decimal.

- **Recurring decimal:**

A decimal in which one or more digits repeat indefinitely is called Recurring decimal or Periodic decimal. e.g. 0.3333..., 21.134134..... are examples of recurring decimals.

- **Note:** Every terminating and recurring decimal is a rational number because it can be converted into common fraction.

- **Non-terminating decimal or non-recurring decimal:**

- Decimal which neither terminates nor it is recurring. it is not possible to convert it into a common fraction. Thus non-terminating, non-recurring decimals represent irrational number. e.g. $= 3.1415... \sqrt{3}$, we don't have exact decimal representation of this number.

- **Binary operations:** A Binary operation in a set A is a rule usually denoted by $*$ that assigns to any pair of elements of A to another element of A . e.g. two important binary operations are addition and multiplication in a set of real numbers.

- **Complex number:** The number of the form of $z = x + iy$, where $x, y \in \mathbb{R}, i = \sqrt{-1}$ is called complex number. Here x is called real part and y is called imaginary part of z . e.g. $2 + 3i, 3 - 4i, -5 + 7i$ etc.

- **Real Plane or Coordinate Plane:** The geometrical plane on which coordinate system has been specified is called the Real Plane or the Coordinate Plane.
- **Argand diagram:** The figure representing one or more complex numbers on the complex plane is called Argand diagram.

Modulus of complex number:

The Modulus of a complex number is the distance from the origin of the point representing the number. It is denoted by $|x+iy|$ or $|(x,y)|$.

Activity # 1

Write the multiplicative inverse of $(\sqrt{2}, -\sqrt{5})$.

1. Show that $(Z-\bar{Z})^2$ is a real number where "Z" is a complex number
2. Prove that $Z = \bar{Z}$ iff Z is a real number.
3. Simplify $(-ai)^4, a \in \mathbb{R}$.
4. Is the set $\{0, -1\}$ closed, w.r.t. multiplication, explain it.
5. Express $\sqrt{3} + i$ in polar form.
6. Find the multiplicative inverse of each of the following numbers: $(-4, 7)$
7. Simplify by expressing in the form $a + bi$ $(2, 3)(3, 3)$.
8. Prove that the sum as well as the product of any two conjugate complex numbers is a real number.
9. Simplify the following $(a + b)^{-2}$

Chapter 03: Matrices and determinants

- **Matrix:**

An arrangement of different elements in the rows and columns, within square brackets is called Matrix.

e.g. $A = \begin{bmatrix} 8 & 4 & 3 \\ 0 & 6 & 2 \end{bmatrix}$

- **Order:** Order of Matrix tells us about no. of rows and columns.

Order of a matrix = no. of rows no. of column.

- **Row Matrix:** A matrix having single row is called Row Matrix.

e.g. $B = [1 \ 4 \ 6]$

- **Column Matrix:** A matrix having single column is called Column Matrix.

e.g. $B = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$

- **Square Matrix:** A matrix in which no. of rows and columns are equal is called Square Matrix. e.g.

$$C = \begin{bmatrix} 6 & 4 \\ 8 & 2 \end{bmatrix}$$

- **Rectangular Matrix:** A matrix in which no. of rows and columns are not equal is called Rectangular

$$\text{Matrix. e.g. } B = \begin{bmatrix} 9 & 8 & 3 \\ 0 & 8 & 5 \end{bmatrix}$$

- **Diagonal Matrix:** A square matrix having each of its elements except principle diagonal equal to zero and at least one non-zero element in its principle diagonal is called Diagonal Matrix. e.g.

$$B = \begin{bmatrix} 6 & 0 & 0 \\ 0 & 5 & 0 \\ 0 & 0 & 2 \end{bmatrix}$$

- **Scalar Matrix:** A diagonal matrix having same elements in principle diagonal except 1 is called

$$\text{Scalar Matrix. e.g. } B = \begin{bmatrix} k & 0 & 0 \\ 0 & k & 0 \\ 0 & 0 & k \end{bmatrix}$$

- **Unit Matrix or Identity Matrix:** Let $A = [a_{ij}]$ be a square matrix of order n . If $a_{ij} = 0$ for all $i, j \neq 0$ and $a_{ij} = 1$ for all $i = j$ then the matrix A is called a Unit Matrix or Identity Matrix of order n . It is denoted

$$\text{by } I_n. \text{ e.g. } A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

- **Null Matrix or Zero Matrix:** A square or rectangular matrix whose each element is zero, is called a

$$\text{Null or Zero Matrix. It is denoted by } O = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

- **Equal Matrix:** Two matrices are said to be equal if they are of the same order with the same corresponding elements. e.g. $A = \begin{bmatrix} 3 & 4 \\ 2 & 4 \end{bmatrix}$ $B = \begin{bmatrix} 3 & 6 - 2 \\ 2 & 5 - 1 \end{bmatrix}$

- **Upper Triangular Matrix:** If all elements below the principle diagonal of square matrix are zero

$$\text{then it is called Upper Triangular Matrix. e.g. } B = \begin{bmatrix} 3 & 5 & 7 \\ 0 & 6 & 0 \\ 0 & 0 & 4 \end{bmatrix}$$

- **Lower Triangular Matrix:** If all elements above the principle diagonal of square matrix are zero, then it

$$\text{is called Lower Triangular Matrix. e.g. } B = \begin{bmatrix} 3 & 0 & 0 \\ 2 & 6 & 0 \\ 2 & 8 & 4 \end{bmatrix}$$

- **Singular Matrix:** A square matrix A is called singular if $|A| = 0$.

- **Non-Singular matrix:** A square matrix A is called non-singular if $|A| \neq 0$.

- **Symmetric matrix:** For a square matrix A , if $A^t = A$, then A is called symmetric matrix.

- **Skew symmetric matrix:** A be the square matrix if $A^t = -A$, then A is called skew symmetric matrix.

- **Rank:** Number of Non zero row in a reduced echelon form of the given matrix is called rank of the matrix.

Activity# 1

1. Find the value λ if the matrix $\begin{bmatrix} 4 & \lambda & 3 \\ 7 & 3 & 6 \\ 2 & 3 & 1 \end{bmatrix}$ is singular
2. Define scalar matrix and give its example.
3. If the matrix A and B is symmetric and $AB=BA$, show that AB is symmetric.
4. If the matrix A is symmetric or skew symmetric then show that A^2 is symmetric.
5. Find AB if $A = \begin{bmatrix} 2 & -1 \\ -1 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & -3 & 8 \\ 3 & 3 & -7 \end{bmatrix}$
6. Without expansion, verify that $\begin{vmatrix} -a & 0 & c \\ 0 & a & -b \\ b & -c & 0 \end{vmatrix} = 0$
7. Use matrices to solve the system of equations $x_1 - 2x_2 + x_3 = -4$, $2x_1 - 3x_2 + 2x_3 = -6$, $2x_1 + 2x_2 + x_3 = 5$.
8. Solve the following systems of linear equations by Cramer's rule.
 $2x_1 - 3x_2 + 2x_3 = -6$, $2x_1 + 2x_2 + x_3 = 5$, $x_1 - 2x_2 + x_3 = -4$
9. If A and B are square matrices of the same order, then explain why in general?
 $(A - B)(A + B) = A^2 - B^2$
10. If A and B are square matrices of the same order, then explain why
 $(A-B)^2 \neq A^2 - 2AB + B^2$?

4. Islamiyat

- 1- ایک اچھے مسلمان کی کیا خصوصیات ہیں؟
- 2- اسلامی عقائد کونسے ہیں؟ ہماری زندگی میں ان کی کیا اہمیت ہے؟
- 3- عقیدہ توحید سے کیا مراد ہے؟ انسانی زندگی پر اس کے کیا اثرات ہیں؟
- 4- ہمیں اپنے خاندان کے ساتھ کس طرح رہنا چاہیے؟
- 5- مشہور فرشتوں کے نام اور کام کے بارے میں ایک چارٹ بنائیں۔
- 6- تلاوت قرآن کے دس فائدے لکھیں۔
- 7- تعطیلات کے دوران کوئی سی پانچ دعائیں یاد کریں اور لکھیں۔
- 8- Covid-19 کے دوران آپ نے کیا کیا احتیاطی تدابیر اختیار کی ہیں؟
- 9- کرونا وائرس جیسی موذی وباء سے بچنے سے متعلق اسلامی تعلیمات کیا ہیں؟
- 10- ہمسائیوں کی اقسام اور حقوق بیان کریں۔
- 11- نماز عیدین کا طریقہ لکھیں۔
- 12- احترام قانون سے متعلق اپنی معلومات بیان کریں۔
- 13- مسجد کے آداب کے بارے میں اسلامی تعلیمات کیا ہیں؟
- 14- Covid-19 کے دوران ایک مسلمان کو مسجد میں کیا کیا احتیاطی تدابیر اختیار کرنی چاہئیں؟
- 15- عید قربان کا فلسفہ کیا ہے؟
- 16- کن لوگوں کو زکوٰۃ نہیں دی جاسکتی؟
- 17- ایک اچھے طالب علم کے فرائض کیا ہیں؟
- 18- اسلام میں نماز کی اہمیت قرآن اور حدیث کی روشنی میں بتائیں۔
- 19- علم کی اہمیت سے متعلق رسول ﷺ کی زندگی کا کوئی واقعہ بیان کریں۔
- 20- حسد کے انسانی زندگی پر کیا اثرات مرتب ہوتے ہیں؟

5. Physics

Learn these important definitions: (memorise, memorise memorise – that's the trick to success in FSc)

- **Physics** is the study of entire Physical World.
- The most **basic quantities** that can be used to describe the Physical World are mass, length and time. All other quantities, called **derived quantities**, can be described in terms of some combinations of the base quantities.
- The internationally adopted system of units used by all the scientists and almost all the countries of the world is **International System (SI)** of Units. It consists of seven base units, two supplementary units and a number of derived units.
- Errors due to incorrect design or calibrations of the measuring device are called **systematic errors**. **Random errors** are due to unknown causes and fluctuations in the quantity being measured.
- The **accuracy** of a measurement is the extent to which systematic error make a measured value differ from its true value. The accuracy of a measurement can be indicated by the number of significant figures, or by a stated uncertainty.
- The **significant figures or digits** in a measured or calculated quantity are those digits that are known to be reasonably reliable.
- The result of multiplication or division has no more significant figures than any factor in the input data. Round off your calculator result to correct number of digits.
- In case of addition or subtraction, the precision of the result can only be as great as the least precise term added or subtracted.
- Each basic measurable physical property represented by a specific symbol written within square brackets is called a **dimension**. All other physical quantities can be derived as combinations of the basic dimensions
- Equations must be dimensionally consistent. Two terms can be added only when they have the same dimensions.
- The arrangement of mutually perpendicular axes is called **rectangular or Cartesian coordinate system**.
- A **scalar** is a quantity that has magnitude only, whereas a **vector** is a quantity that has both direction and magnitude.
- The sum vector of two or more vectors is called **resultant vector**.
- Graphically the vectors are added by drawing them to a common scale and placing them head to tail, the vector connecting the tail of the first to the head of the last vector is the resultant vector.
- A **unit vector** describes directions in space. A unit vector has a magnitude of 1 with no units.

- A vector of magnitude zero without any specific direction is called **null vector**. The vector that describes the location of a particle with respect to the origin of coordinate system is known as **position vector**.
- A body is said to be in equilibrium under the action of several forces if the body has zero translational acceleration and no angular acceleration.
- For a body to be in **translational equilibrium** the vector sum of all the forces acting on the body must be zero.
- The **torque** is defined as the product of the force and the moment arm.
- The **moment arm** is the perpendicular distance from the axis of rotation to the direction of line of action of the force.
- For a body to be in **rotational equilibrium**, the sum of torques on the body about any axis must be equal to zero.
- **Newton's laws of motion:**
- **1st Law:** The velocity of an object will be constant if net force on it is zero.
- **2nd Law:** An object gains momentum in the direction of applied force, and the rate of change of momentum is proportional to the magnitude of the force
- **3rd Law:** When two objects interact, they exert equal and opposite force on each other for the same length of time, and so receive equal and opposite impulses.
- The **momentum** of an object is the product of its mass and velocity. The impulse provided by a force is the product of force and time for which it acts.
- For any isolated system, the total momentum remains constant.
- **Elastic collisions** conserve both momentum and kinetic energy.
- In **inelastic collision**, some of the energy is transferred by heating and dissipative forces such as friction, air resistance and viscosity so increasing the internal energy of nearby objects.
- **Projectile motion** is the motion of a particle that is thrown with an initial velocity at an angle θ and then moves under the action of gravity.

- **2 Activity**

Conservation of Energy:

Let's explore some activity for the conservation of energy.

Energy Saving Pendulums:

Pendulums are an easy way to demonstrate conservation of energy to students. You can create pendulums to test in the classroom/home with very few materials. Additionally, there are many practical examples of pendulums, from grandfather clocks to equipment used to monitor and study earthquakes.

Materials:

- fishing weight
- fishing line
- yardstick (or should this be a metre rule?)
- piece of poster board marked with a grid pattern
- masking tape
- red marker

Procedure:

Law of conservation of energy states that energy cannot be created or destroyed. It can only be transferred from one object to another. If this law weren't true, a pendulum would never work. It would stop moving very quickly.

Tape the grid paper against a wall. On either side of the grid paper, position two chairs no wider than the length of the yardstick. Mark a line down the center line of the grid on the wall so that it is halfway between each chair.

At the midpoint of the yardstick, tie a piece of fishing line. At the end of the line, attach their weight. The yardstick can stick atop the chairs to allow the pendulum to swing.

Raise the fishing weight slightly to the right of the center line and make a mark on the grid paper before you release it. Let it swing a few minutes and mark the highest point it reaches on the left side of the grid paper.

Repeat this process for 2-3 different heights.

Notice the height of the rise of the pendulum is equal to the same distance past the center line it travels.

The distance between how far the pendulum is lifted and travels is due to the conservation of energy. When you raise the pendulum to a point, it has a specific amount of potential energy. That energy is transformed into an equal amount of kinetic energy, allowing the pendulum to move to the same height on the paper.

3-Think-Search-Answer (TSA)

- Can gold be created from other elements?
- As light from a star spreads out and weakens, do gaps form between the photons?
- Can a fire have a shadow?
- Can air make shadows?

- Can radio antennas emit visible light?
- Can sound waves generate heat?
- What is the shape of an electron?
- What is the speed of electricity?
- What is the strongest magnetic field possible? Is there a limit?
- What keeps a bicycle balanced?
- What makes heat rise?

Do You Know?

- Because of differences in gravity, a 200 pound person would only weigh 76 pounds on Mars.
- Electric eels can stun both predators and prey with electric shocks of around 500 volts.
- Energy from food is usually measured in joules or calories.
- Light from the Earth takes just 1.255 seconds to reach the Moon.
- Sound travels at a speed of around 767 miles per hour (1,230 kilometres per hour).
- When traveling at 80 kilometers per hour (50 miles per hour), cars use around half of their fuel just to overcome wind resistance.
- Water can work against gravity, moving up in narrow tubes in a process called capillary action.
- A magnifying glass uses the properties of a convex shaped lens to magnify an image, making it easier to see.
- A scientist who studies physics is known as a physicist.
- Uranus is the only planet in our solar system that rolls on its side like a barrel, while Venus is the only planet that spins in the opposite direction to Earth.
- The fastest land animal in the world is the cheetah, clocking a max speed of around 113 km per hour (70 mph).
- 1921 Nobel Prize in Physics was won by Albert Einstein for his work in the field of Theoretical Physics.

6. Chemistry

Chemical Bonding

Introduction:

A **chemical bond** is defined as a force of attraction between atoms that holds them together in a substance. In other words, during bond formation there is some force which holds the atoms together.

This attaining of 8 electrons configuration in the outermost shell either by sharing, by losing or by gaining electrons, is called **octet rule**. This octet rule only symbolizes that noble gas electronic configuration should be attained by atoms when they combine or react. For elements like hydrogen or helium, which have only s-subshell, this becomes 'duplet rule'. It plays a significant role in understanding the formation of chemical bond between atoms.

Ionic Bond:

The bond which is formed by the complete transfer of electron or electrons from an atom with low ionization energy to another atom with high electron affinity is called **ionic bond**.

- In energy terms, the electropositive elements are at a higher energy state than the electronegative elements. The energy difference will be responsible for the transfer of electrons from a higher energy state to a lower energy state.
- The elements of Group-1 and Group-2 being metals, have the tendency to lose their valence electrons forming positively charged ions. They are electropositive elements.
- Non-metals of Group-15 to Group-17 have the tendency to gain or accept electrons. They are electronegative elements with high electron affinities. If atoms belonging to these two different groups, metals and non-metals, are allowed to react, ionic bond is formed.

Remember:

- Opposite charges attract each other and similar charges repel each other. Opposite charged ions can bond to each other while similarly charged cannot.
- Metals of Group 3,4, and transition metals also form ionic bonds with non-metals.

In this activity, you will get some practice in learning how atoms form ionic compounds.

Activity:

1. Potassium and Bromine

Ion Name	Ion Symbol	Anion/Cation	How many?	Chemical formula

2. Potassium and Oxygen

Ion Name	Ion Symbol	Anion/Cation	How many?	Chemical formula

3. Magnesium and Bromine

Ion Name	Ion Symbol	Anion/Cation	How many?	Chemical formula

4. Aluminum and Nitrogen

Ion Name	Ion Symbol	Anion/Cation	How many?	Chemical formula

5. Lead (IV) and Nitrogen

Ion Name	Ion Symbol	Anion/Cation	How many?	Chemical formula

6. Copper (II) and Hydroxide

Ion Name	Ion Symbol	Anion/Cation	How many?	Chemical formula

7. Ammonium ion and Nitrate ion

Ion Name	Ion Symbol	Anion/Cation	How many?	Chemical formula

8. Calcium and Phosphate

Ion Name	Ion Symbol	Anion/Cation	How many?	Chemical formula

9. Ammonium ion and Phosphate

Ion Name	Ion Symbol	Anion/Cation	How many?	Chemical formula

10. Aluminum and Phosphate ion

Ion Name	Ion Symbol	Anion/Cation	How many?	Chemical formula

11 and 12. Make two compounds of Iron and Oxygen

Ion Name	Ion Symbol	Anion/Cation	How many?	Chemical formula

Ion Name	Ion Symbol	Anion/Cation	How many?	Chemical formula

13 and 14. Make two compounds of Lead and Sulfur

Ion Name	Ion Symbol	Anion/Cation	How many?	Chemical formula

Ion Name	Ion Symbol	Anion/Cation	How many?	Chemical formula

15 and 16. Make two compounds of Copper and Oxygen

Ion Name	Ion Symbol	Anion/Cation	How many?	Chemical formula

Ion Name	Ion Symbol	Anion/Cation	How many?	Chemical formula

--	--	--	--	--

Using the above data, make the "formula units" of some other ionic compounds and write their names.

Like:	Chemical formula of compound	Names
-------	------------------------------	-------

Questions.

1. What was the overall charge on all of the formula units that you constructed?
2. Compare your pieces with the Periodic Table and answer these questions.
 - a) Do non-metals form anions or cations?
 - b) Do metals form anions or cations?
 - c) What is the charge for all of the elements in group 1?
 - d) What is the charge for all of the elements in group 2?
 - e) What is the charge for all the elements in group 17?
 - f) Do cation pieces fit with other cation pieces?
 - g) Do anion pieces fit with other anion pieces?
3. What types of elements (metals, metalloids, or nonmetals) form ionic bond with metals and why?
4. What type of elements (metals, metalloids, or nonmetals) form ionic bonds with non-metals and why?
5. Write the chemical formula that results when the following pairs of ions combine to form an ionic bond.
 - a. Sr^{2+} and O^{2-}
 - b. Mn^{4+} and O^{2-}
 - c. Li^{+} and Cl^{-}
 - d. Cs^{+} and S^{2-}

7. Biology

1. Compare a bacterial cell and a human body cell. Include in your response:

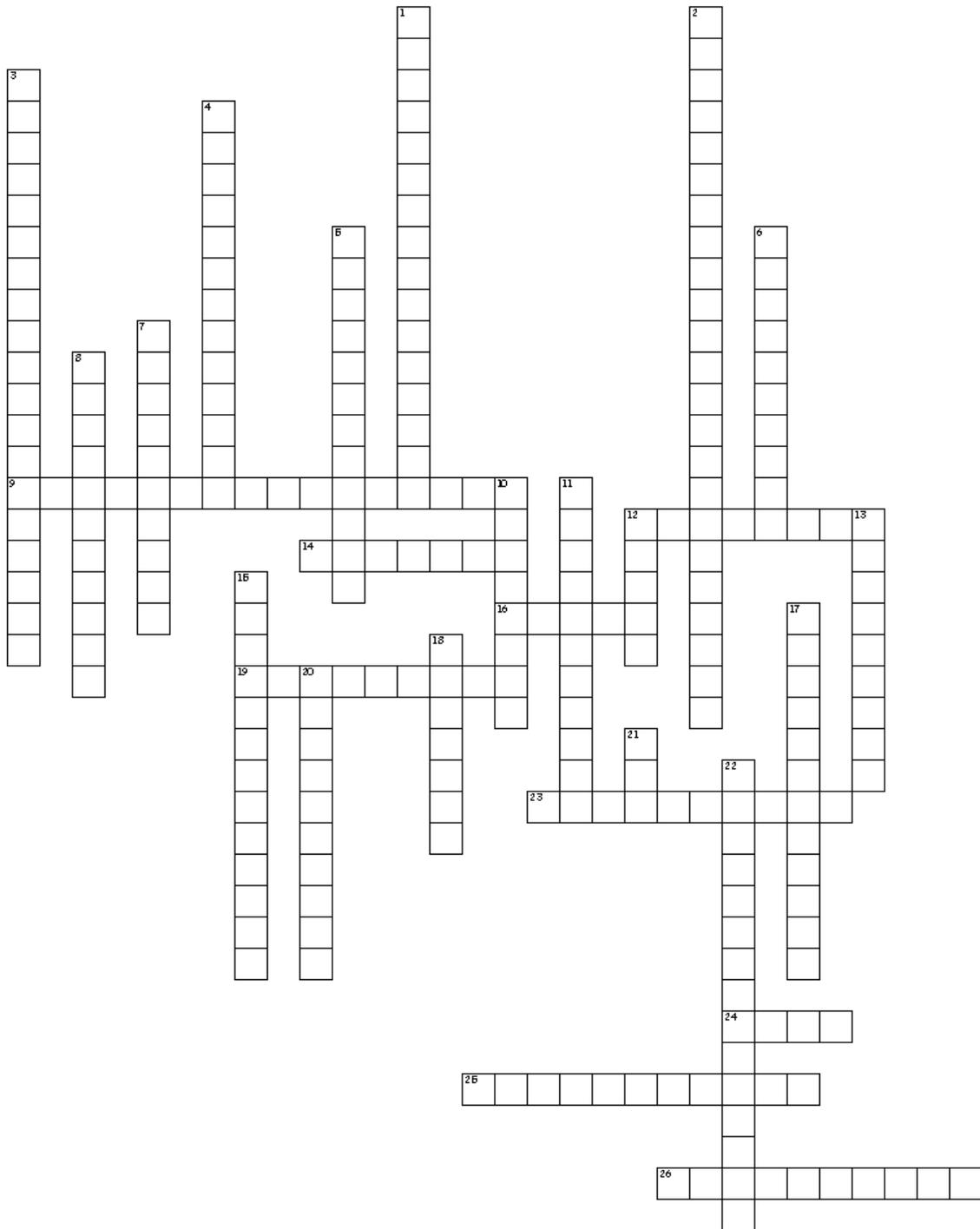
- How they are similar and different in structure
- How they are classified

2. Complete the following:

Organelle	Function	Where found (animal, plant, and/or, prokaryote)
Plasma membrane		
Ribosome		
Vacuole		
Cell wall		
Centriole		

CROSSWORD

Human Impact on the Environment



Across

- 9. Rain or snow with an acid pH that makes soil and water on Earth more acidic
- 12. The effect CFC's have on our ozone layer
- 14. Ecological areas identified to be rich in biodiversity and are in much need of protection
- 16. O₃ gas in our atmosphere
- 19. The part of Earth where all living things are found
- 23. Habitat destruction cause this reduction in the size of some populations

24. Air pollution composed of water vapor and chemicals from human activities
25. All rivers, lakes, streams, oceans, rivers, and ponds on Earth
26. Protected wetlands in the southern United States that is rich in organisms

Down

1. Ability of the Earth's atmosphere to trap heat and keep us warm
2. The increase in concentration of some chemicals within organisms as you goes higher in a food chain
3. Chemicals once used as refrigerator coolants and aerosol can propellants affecting the Earth's ozone layer
4. Greenhouse gas that cycle by the processes of photosynthesis and cellular respiration
5. Scientists trying to identify, manage, and protect natural areas where many organisms live
6. The death of all members of a species of organisms
7. Mixture of gases that surrounds the Earth
8. Burning these increases the amount of carbon dioxide in the Earth's atmosphere
10. The main gas making up the Earth's atmosphere
11. Scientists trying to repair ecosystems that are badly damaged
12. percent of Earth covered with freshwater suitable for drinking
13. Earth's rock interior extending from the molten core to the crust
15. Increase in the average temperature of the Earth possibly due to an increase in the levels of carbon dioxide in the atmosphere
17. Variety of different types of organisms living in an area
18. percent of the Earth covered with water
20. Absorbs most of the sun's harmful, ultraviolet rays before they reach Earth
21. Molecule that is damaged by too much ultraviolet radiation
22. Group of organisms that are important to the life of many other types of organisms in an ecosystem

Meiosis Model

Introduction:

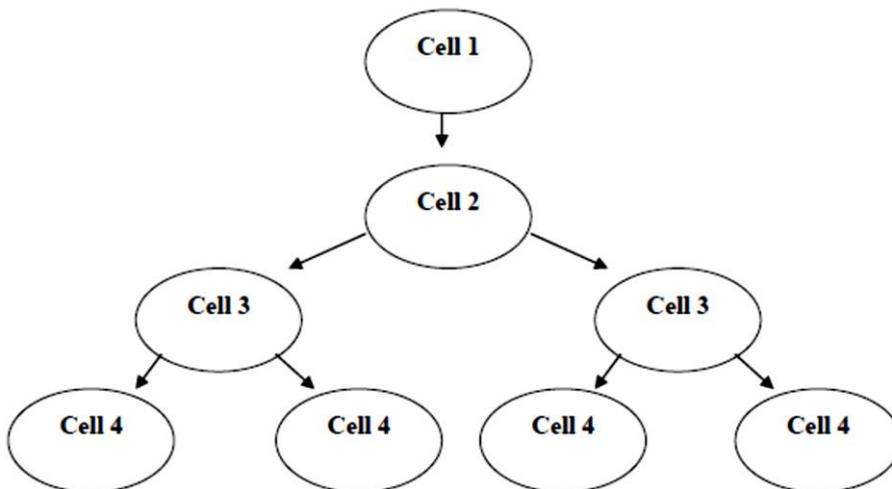
Sexual reproduction requires two parents and involves two processes: *meiosis* and *fertilization*.

Meiosis is the process that produces *gametes*, or sex cells. The gametes produced are *haploid*, which means the cells have one copy of each kind of chromosome. For example, if the organism's chromosome number is eight, all of the body cells will contain 8 chromosomes; however its sex cells will contain 4 chromosomes. Through fertilization, a *diploid* cell called a *zygote* is produced from the union of a haploid sperm cell (male gamete) and a haploid egg cell (female gamete). Both meiosis and fertilization are important contributors to *genetic variation* within an offspring.

Meiosis involves two divisions. The first division, Meiosis I, involves pairing the *homologous chromosomes* and then separating the homologues into separate cells (which reduces the chromosome number by half). Because any cell division is preceded by *DNA replication*, the second division of meiosis (Meiosis II) involves the separation of the individual duplicated chromosomes (sister chromatids).

Procedure:

1. Copy the diagram below onto your poster paper. Each circle represents a cell.



2. This organism's chromosome number is 4 ($2n = 4$). This means each body cell contains two different homologous pairs. All of the genetic information is found on a total of two chromosomes (chromosome 1 and chromosome 2). However, each body cell contains two copies of each chromosome, one copy from mom and the other copy from dad. Choose two similar colors of pipe cleaners for chromosome 1 (for example mom chromosome 1 = pink and dad chromosome 1 = red). Choose two similar colors of pipe cleaners for chromosome 2 (for example mom chromosome 2 = lavender and dad chromosome 1 = purple).

3. **Cell 1** is the diploid body cell before meiosis begins. Glue the correct number and types of pipe cleaners into **Cell 1** to show the two pairs of homologous chromosomes.

4. Before meiosis I begins, the chromosomes replicate. Obtain more pipe cleaners to represent *DNA replication*. Glue the correct number and types of pipe cleaners into **Cell 2** to show the replicated chromosomes. This cell represents the cell during prophase I. The two homologous chromosomes should line up next to each other to form a *tetrad*. *Crossing-over* may occur at this point in the cell cycle.

5. Illustrate at least one crossing-over event in **Cell 2**. Be sure to account for the "new" chromosomes produced as the result of crossing-over throughout the rest of your model.

6. **Cells 3** are the two cells produced at the end of meiosis I. Use pipe cleaners to show the correct number and types of chromosomes present in each cell

Home Activities

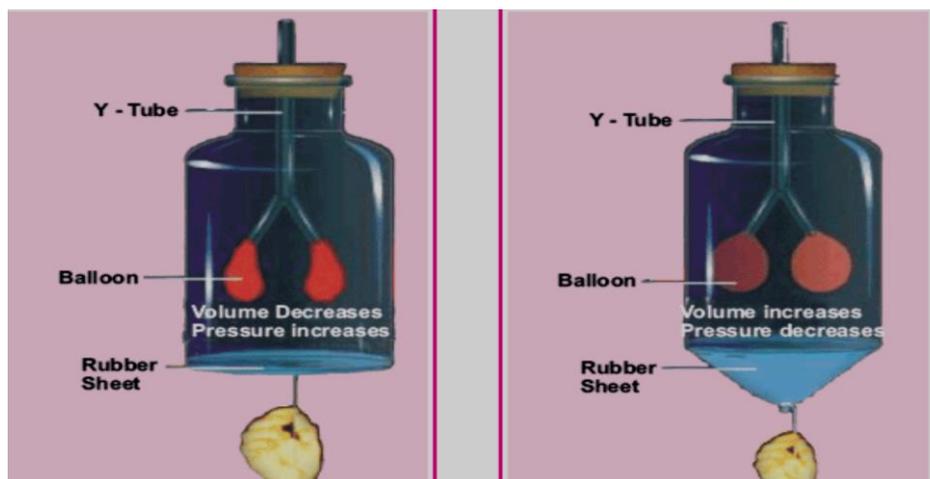
1. Mix a batch of bread dough and separate it into several different bowls; place them in different places (outside, inside, in the dark, in the light) to see which environment yeast thrives in.
2. Grow a bean in a clear cup to watch the roots grow down and stem grow up.
3. Grow mold on bread by putting slices in different environments (in a bag in the dark, in a bag in the sunlight, out in the open, in the refrigerator); see which one gets moldy first.
4. Make a model to show the action of diaphragm

Apparatus: a bell jar, 'Y' shaped glass tube, two balloons, rubber sheet

Procedure:

- Take a bell jar. Fix a 'Y' shaped glass tube towards its rounded end, as shown in the figure. Tie a balloon on the open ends of the two branches of glass tube.
- Tie a thin rubber sheet on the open end of the jar. The cavity of the bell jar acts as the thoracic cavity, the "Y" shaped tube as the trachea that branches into bronchi. The rubber sheet acts as the diaphragm and the balloon act as the lungs.
- To demonstrate inspiration, pull the rubber sheet down. The balloons get inflated. This shows how the lungs are filled with air when the diaphragm moves down.
- To demonstrate expiration, the rubber sheet is allowed to go back to its original position. The balloons get deflated. This shows how the lungs are deflated when the diaphragm comes back to its original position.

Practical Work:



Investigate the breathing rate at rest and after exercise

The activity involves students exerting themselves in light exercise and monitoring their breathing rate for a period afterwards.

Problem: What is the effect of exercise on the breathing rate?

Apparatus required: Stopwatch or wristwatch

Background information:

- The autonomic nervous system is specialized for controlling our automatic responses, for example breathing rate, heart rate and digestion. These are the processes that we do without conscious thought.
- The respiratory center in the brain is sensitive for the blood carbon dioxide concentration.
- When we do exercise, our muscle cells increase the rate of cellular respiration so that the concentration of carbon dioxide increases in blood.
- To remove excess of carbon dioxide and to get more oxygen, respiratory centre sends messages to the respiratory system to increase the breathing rate.

Procedure:

SAFETY: Supervision of activity by teachers will ensure that the activity does not become competitive. The activity should be appropriate to footwear and clothing worn by students, for example, walking briskly up/down stairs or steps up onto a low bench in the lab. Students with identified physical/ health problems should not be involved. Asthmatics may be able to take part if they use their inhalers prior to starting the exercise.

- The activity will be performed in groups (each consisting of 3 students).
 - Each group will note down the readings in the form of table.
1. Each group will take the breathing rate, at rest, of its members and will get the average.
 2. The group members will do some light exercise (e.g; running for 5 minutes).
 3. The group will take the breathing rate of its members after exercise and will get the average.
 4. The members will do more hard exercise (running for 10 minutes).
 5. The group will take the breathing rate of its members after hard exercise and will get the average.

Evaluation:

- What was the average breathing rate at rest?
- What was the average breathing rate after light exercise?
- After which exercise, the breathing rate showed more increase?
- Why did the breathing rate increase during exercise?

8. Economics

Activity 1:

Needs and Wants

Needs: Needs are things that keep us healthy and safe, and are necessary for survival. For example: food, clothes and shelter.

Wants: A want is something that we would like to have but we do not need. For example: toys, video games and stuffed toys.

Q. Pick the right option.

1. Desires for things that we may or may not actually require

- | | | | |
|----------|----------|------------|-----------|
| A) Needs | B) Wants | C) Desires | D) Wishes |
|----------|----------|------------|-----------|

2. Something that is required for survival

- | | | | |
|----------|----------|------------|-----------|
| A) Needs | B) Wants | C) Desires | D) Wishes |
|----------|----------|------------|-----------|

3. Desires for such things as sports equipment, cars, haircuts, etc. that you will need to spend money on

- | | |
|-------------------|----------------------|
| A) Economic Needs | B) Noneconomic Wants |
| C) Economic Wants | D) Noneconomic Needs |

4. Wants that can be satisfied without spending money

- | | |
|-------------------|----------------------|
| A) Economic Needs | B) Noneconomic Wants |
| C) Economic Wants | D) Noneconomic Needs |

5. Item, that you spend money on, must be a physical object, must be useful, and must be scarce.

- | | |
|------------------|---------------------|
| A) Economic Good | B) Noneconomic Want |
| C) Scarce | D) Economic Service |

6. Productive act that satisfies economic wants

- | | |
|------------------|---------------------|
| A) Economic Good | B) Noneconomic Want |
| C) Scarce | D) Economic Service |

7. A thing that is perceptible by touch

- | | | | |
|-----------|-------------|---------|------------|
| A) Scarce | B) Tangible | C) Want | D) Service |
|-----------|-------------|---------|------------|

8. There is not enough of it so that anyone and everyone can freely have as much as they want

- | | | | |
|---------|-------------|----------|-----------|
| A) Need | B) Tangible | C) Wants | D) Scarce |
|---------|-------------|----------|-----------|

9. People who use goods and services

- | | | | |
|--------------|------------|--------------|------------|
| A) Producers | B) Sellers | C) Consumers | D) Puppets |
|--------------|------------|--------------|------------|

10. Finding out exactly what consumers want

- | | |
|-------------------------|--------------------|
| A) Economic Development | B) Market Research |
| C) Scarce | D) Discussion |

Write the answers of the following:

1. Differentiate between needs and wants.
2. Give examples of needs and wants (at least 3)
3. Define non-economic wants with examples.

Goods and Services

There are four factors of production in Economics.

- (A) Land (B) Labor (C) Capital (D) Organization

Q. Define all factors of productions with examples?

Activity 4:

The law of supply

According to the law of supply, the higher the price, the larger the quantity produced. So as price increases, quantity supplied also increases. And as price falls, quantity supplied also falls.

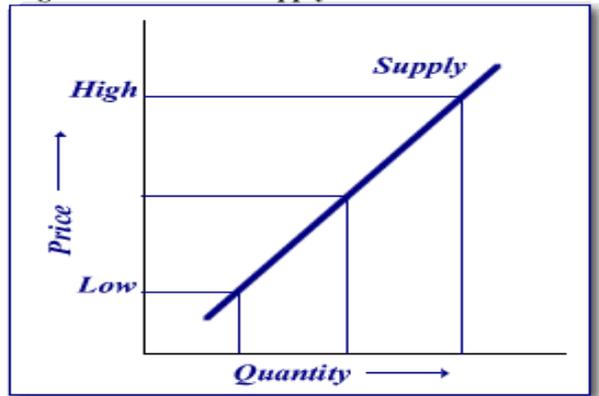
Determinants of supply

- Cost of resources use to make the goods
- Price of other goods these resources could make.
- Technology used to make the goods.
- Producer’s expectations
- Number of sellers in the market.

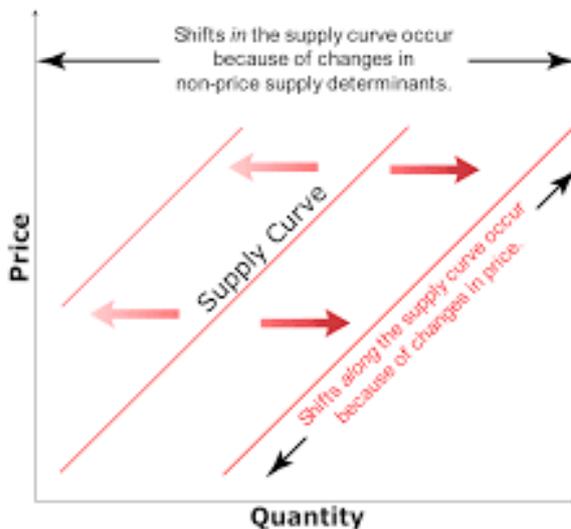
Causes of shifts in market supply

- Changes in production costs:
 - Wage costs
 - Raw materials and components
 - Energy costs
- Government taxes and subsidies
- Climatic conditions (important for agricultural supply)
- Changes in production technologies
- Change in the number of producers in the market
- Changes in the objectives of suppliers in the market
- Changes in the prices of substitutes in production

Figure 2 Market Supply Curve



Shifts in Non-Price Supply Determinants



Q. Explain the concept of law of supply with the help of a graph.

Q. Write the determinants of supply in the form of paragraphs.

Q. Explain the causes of shifts in supply and draw a graph as well.

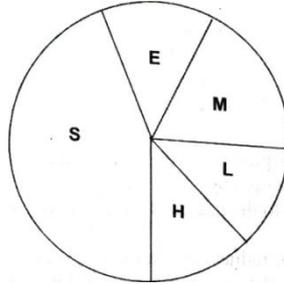
Mathematics and Statistics in Economics

- Attempt these short questions.
 1. What are variables?
 2. What is a function?
 3. Differentiate between increasing and decreasing functions.
 4. Write down the formula of quadratic equation.
 5. Define “parameters”
- Solve the following equations.
 1. $3x - 2 = 4x + 3(6x + 8)$
 2. $3\left(\frac{x+2}{2}\right) + 2\left(\frac{4x-8}{5}\right) = 8\left(\frac{2x-6}{6}\right)$
 3. $9x^2 - 3x - 6 = 0$
 4. $x^2 + 12x + 35 = 0$
 5. $3x + 4y = 7$
 6. $2x + y = 3$
 7. $2x - y = 3$
 $x + 2y = 14$
 8. $4x + 5y = 6$
 $3x - 2y = 10$
 9. $2x^2 - 4y^2 = 50$
 $x + y = 6$
 10. $x^2 - y^2 = 106$
 $2x - 3y = 8$

9. Statistics

Presentation of Data

Q (a) The pie chart shown represents the amount of time spent by a pupil on various subjects in school during a particular week. The subjects are Mathematics (M), English (E), Science (S), History (H) and Languages (L).



Measure and write down the angle of the sector which represents languages.

He spends 5 hours on Mathematics per week.

Calculate the amount of time spent on Languages.

(b) In 1984 the total amount of money raised for charity by a school was

Rs. 2000. The allocation of this amount was illustrated by a pie chart of radius 5 cm. Calculate the radius of a comparable pie chart down to represent the allocation of the 1985 total amount raised of Rs. 2880.

Q. A census was taken of 264 cars to determine what type of fuel they used. The results of the census are shown below.

Type of fuel	Number of cars
Leaded petrol	70
Unleaded petrol	172
Diesel	22

The data is to be illustrated by a pie chart.

Calculate, each to the nearest degree, the sector angles of the pie chart.

Using a circle of radius 5 cm, draw the pie chart.

A similar census involving 340 cars was taken in a different town.

(iii) Calculate, to 3 significant figures, the radius of the comparable pie chart which would represent the 340 cars.

Q.3 A man runs regularly over the same cross-country course. The table gives his time for 60 of these runs, each time being rounded up to the next whole second.

Time	Number of runs
53m 0s - 53m 30s	4
53m 31s - 54m 0s	7
54m 1s - 54m 30s	16
54m 31s - 55m 0s	17
55m 1s - 55m 30s	11
55m 31s - 56m 0s	5
Total	60

State the exact boundaries of the class interval labeled "54m 1s 54m 30s".

Calculate, to the nearest second, an estimate of the median time.

(iii) Calculate, to the nearest of a second, an estimate of the interquartile range.

Q. The following list gives the marks obtained by 60 pupils in a Statistics examination (Maximum mark = 50).

4	23	35	27	32	15	29	19	25	18
36	11	33	12	6	30	20	24	27	25
16	40	21	35	20	17	9	30	14	29
31	26	25	21	32	23	18	26	11	28
43	24	10	37	22	34	23	16	11	35
31	48	23	47	15	6	35	3	43	21

Copy and complete the following grouped frequency table (the first group has been done for you).

Mark	Tally	Frequency
1 – 10		
11 – 20		
21 – 30		
31 – 40		
41 -50		

Write down the modal class for the distribution.

Index Numbers

Q. The head teacher of a school analysed the school's expenditure on the three stationary items, paper, books and "other stationery". The following table gives certain information relating to these items for the three year 1990 (taken as base year), 2000 and 2002.

	Price Relatives			1990
	1990	2000	2002	
Paper	100	120	125	4
Books	100	150	160	7
Other		125	125	5

(1) Calculate, to one decimal place, a weighted aggregate index for these costs

for 2002, taking 1990 as base year and using the weights 4, 7 and 5 which were determined in 1990.

Suggest a way in which these weights may have been determined.

The total amount spent on the three items in 1990 was Rs. 28000. Use the index number you calculated in (i) to estimate the total amount spent in 2002, giving your result to the nearest Rs. 1000.

State what you can deduce from the values of the price relative for the "other stationary" in the years 2000 and 2002.

Calculate new price relatives for each of the three items in 2002, taking 2000 as base year, and giving your results to the nearest whole number. The table below shows the actual amounts spent in the year 2000.

Item	Amount (Rs)
Paper	15000
Books	20000
Other stationary	30000

Using these amount as weights, and your results from (v), show that the weighted aggregate index for 2002, taking 2000 as base year is 103.1.

Use your answer to (vi) to: estimate the total amount spent on the three, items in 2002, giving your result to the nearest Rs. 1000.

(viii) Suggest a reason for the difference in your two estimates of expenditure in 2002, using your results from (iii) and (vii).

Probability

Q. (i) Give an example of two events A and B which are such that

$$P(A \text{ and } B) = P(A) \times P(B)$$

(ii) State the name given to events of the kind defined in (i).

Q. A school has the opportunity of taking 100 pupils to a special event. The school has four year-groups A, B, C and D with 88, 96, 104 and 112 pupils respectively.

Find the probability that, if 100 pupils are chosen at random from the school, a particular pupil in year D will be chosen.

The head teacher decided to take 25 pupils, chosen at random, from each year-group.

Find the probability that a particular pupil in year D will be chosen.

(iii) State why this system is unfair to pupils in years C and D.

(iv) Calculate the number of pupils which should be chosen from each year-group if the head teacher makes allowance for the different sized year- groups.

Q. In this question answers which are probabilities be given correct to 3 decimal places.

The table below shows the number of boys and girls attending some extra activities offered to pupils in two year groups, year 4 and year 5, at a junior school.

	Year 5			
	Boys	Girls	Boys	Girls
Swimming club	9	12	15	18
Football coaching	24	3	28	2
Dancing classes	4	20	0	10
Chess club	10	2	5	3
Musical instrument lessons	26	32	24	35

There are, in total, 64 boys and 52 girls in year 4, and 53 boys and 60 girls in year 5.

State what you can deduce from the fact that the total number of boys in

the table is greater than 117.

A pupil is chosen at random from all the pupils in years 4 and 5. Find the probability that this pupil attends the swimming club.

A boy is chosen at random from the two year-groups. Find the probability that he attends the swimming club.

Two boys are chosen at random from year 4. Find the probability that both of these boys attend football coaching.

(v) Two girls are chosen at random, one from each of the two year-groups..

Find the probability that both of these girls attend dancing classes.

Q. Chantelle and Maryann each roll an unbiased cubical dice with faces numbered 1, 2, 3, 4, 5 and 6. Every time they roll their dice, the score, X , is the difference between the numbers shown on the faces which land uppermost. If the numbers on the faces are unequal, the difference is always calculated as being equal to the larger number minus the smaller number.

(i) Copy and complete the following table, inserting, in each cell in the table, the appropriate value of X .

	1	2	3	4	5	6
1						
2						
3						
4						
5						
6						

List the six possible values which X can take.

Tabulate the possible values of X and their probabilities.

Chantelle and Maryann consider playing a number of different games.

Game 1: If the value of X is odd, Chantelle wins the game. If it is even (including 0) then Maryann wins.

Explain why Game 1 is fair.

Game 2: If the value of X is less than 3, Chantelle gives Maryann \$1. If the value of X is 3 or more, Maryann gives Chantelle Rs2.

Explain why Game 2 is fair.

Game 3: If the numbers on the two dice are equal, Chantelle wins. If the numbers on the two dice are unequal, Chantelle gives Maryann a number of dollars equal to the value of X .

(vi) Calculate, in dollars, and to 2 decimal places, the amount which Maryann must give to Chantelle if the numbers are equal, in order to make this game fair.

Q. In a class of 24 children the mean height was 140 cm. After 4 children left the class the mean height of those remaining was 139cm. Calculate the mean height of the 4 children who left the class.

Q. Five people set a mathematical examination consisting of two papers. In the first paper their mean mark was 64 and the standard deviation of their marks was 6.

In the second paper each of these five people scored 8 marks less than in their first paper.

- (i) State the mean and standard deviation of the five people's marks in the second paper.

- (ii) State the mean and standard deviation of their five total scores from the two papers.

Q. The marks scored in a test by a group of eleven students were

8 7 4 19 9 15 7 7 1 25 8

Three different measures of average can be found from the data above. One measure has the value 8.

- (i) Give the name of this statistical measure.
- (ii) Explain briefly how it is obtained.

A second measure has the value 10.

- (iii) Give the name of this statistical measure.
- (iv) Explain briefly how it is obtained.

The third measure has the value 7

- (v) Give the name of this statistical measure.
- (vi) Explain briefly how it is obtained.

10. Computer Science

Task 1. Create a document of your home budget system using **SDLC phases**.

Task 2. Prepare a model of computer network topologies.

Task 3. Prepare a presentation on working of OSI Model using Microsoft PowerPoint Software.

Task 4. Write about cutting edge technologies in IT.

Task 5. Prepare a pictorial presentation on viruses and antiviruses using Microsoft PowerPoint Software.

Task 6. Microsoft Word Excel semi Projects

- Prepare a home budget system.
- Generate the electricity bill.
- Prepare your own result card.

Task 7. Computer Architecture

Create a model of computer architecture which shows different components of computer system and label them.

Task 8. Microsoft Word Semi Projects

- Design an invitation card of birthday party at home.
- Design any monogram in MS Word.
- Make post cards in MS Word.
- Create your daily time table in MS Word.

Task 9. Create a presentation using MS POWER POINT on Applications of Computer Science and IT.

Task 10: What is cyber-bullying? Why do you think people post humiliating/cruel/nasty/false information about other people on public websites like Youtube and social media such as Facebook? How does cyber-bullying affect the target/victim?

11. Critical Thinking

Thinking critically means to question new information before accepting it as true. If you are told something new or read something new, here are some questions that you can ask before accepting the new information as true...

What: -is the source of the information and is it a reputable and reliable source?
 - are some alternative explanations/perspectives?

Who: -benefits (or could benefit) from this information?
 -else have you heard discuss this?
 -is this harmful to?
 -would be best to ask for more information about this topic?
 -is the person generating this information and what is their expertise in the matter?

Where: -could we search for supporting information or information to refute the information?
 -are similar concepts/information available?
 -has this information come from to you?

When: -was this information created?
 -was the information received (compared to when it was created)?

Why: -is the information relevant to you/others?
 -has the information been created and communicated?
 -are people influenced by this information?
 -is this information needed now?

How: -is this information similar to other information?
 -can this information be used?

Read the following 3 news article and apply some critical thinking questions to answer the basic question: should I believe this new information? Which articles do you think are true, not true, not sure and would want more information before deciding? Does the source (where you receive information from) matter in your critical thinking?

Article 1:

The first Arab space mission to Mars has blasted off aboard a rocket from Japan, with its unmanned probe – called Al-Amal, or Hope – successfully separating about an hour after liftoff.

A live feed of the launch showed the rocket carrying the probe lifting off from the Tanegashima Space Centre in southern Japan at 6.58am (9.58pm GMT).

Almost exactly one hour later, the feed showed people applauding in the Japanese control room as the probe successfully detached.

In Dubai, the launch was met with rapturous excitement, with the UAE Mars mission’s deputy project manager Sarah al-Amiri declaring it “an indescribable feeling” to see the probe blasting off.

“This is the future of the UAE,” Amiri, who is also minister of state for advanced sciences, told Dubai TV from the launch site.

The Emirati project is one of three racing to Mars, including Tianwen-1 from China and Mars 2020 from the United States, taking advantage of a period when the Earth and Mars are nearest.

In October, Mars will be a comparatively short 38.6m miles (62m km) from Earth, according to Nasa.

Hope is expected to reach Mars’s orbit by February 2021, marking the 50th anniversary of the unification of the UAE, an alliance of seven emirates.

Unlike the two other Mars ventures scheduled for this year, it will not land on the planet, but instead orbit it for a whole Martian year, or 687 days.

While the objective of the Mars mission is to provide a comprehensive image of the weather dynamics in the red planet's atmosphere, the probe is a foundation for a much bigger goal – building a human settlement on Mars within the next 100 years.

The UAE also wants the project to serve as a source of inspiration for Arab youth, in a region too often wracked by sectarian conflicts and economic crises.

On Twitter, the UAE's government declared the probe launch a "message of pride, hope and peace to the Arab region, in which we renew the golden age of Arab and Islamic discoveries."

*Source: The Guardian (July 20, 2020),
<https://www.theguardian.com/science/2020/jul/20/uae-mission-mars-al-amal-hope-space>*

Article 2:

A couple living on the South Island's Otago Peninsula in New Zealand are not giving up hope of finding their beloved dogs – despite having spent \$20,000 (£10,400) and nine months scouring the country for them, to no avail.

Nine-year-old black poodle Dice and three-year-old fox terrier Weed went missing from Alan Funnell and Louisa Andrew's home in October last year.

Since then, Funnell has spent one weekend a month traversing the South Island searching for them.

He and Andrew say they have put up about 400 signs and spent at least NZ\$20,000 in their mission.

"Our dogs to us are like our family, we just know they are out there somewhere," Funnell said. "New Zealand is really not that big a place."

The saga started when Andrew went to feed the couple's chickens and let the dogs out of the car. They ran off, perhaps chasing a rabbit, and did not return.

"We called and called, and they didn't come," said Funnell. "We love our animals. They are great wee dogs. We are not going to give up until we find them."

Members of the public have helped with putting up signs which are now spread throughout country – from the tip of the North Island to the bottom of the South Island.

The couple have raised more than \$10,000 to help with the search from almost 300 donors. "We got a huge amount of support throughout New Zealand and we are lucky to have that," Funnell said.

Funnell thinks the dogs were picked up by tourists after a sighting came through of two dogs being tied to a campervan in the area.

"We have been through a rollercoaster of emotions in the process of it all. We are sure they are alive. We have come to being positive about things," said Funnell.

"We can feel them out there."

*Source: The Guardian (July 20, 2020),
<https://www.theguardian.com/world/2020/jul/20/new-zealand-is-not-that-big-a-place-the-nine-month-20000-search-for-two-lost-dogs>*

Article 3:

American Airlines To Phase Out Complimentary Cabin Pressurization

FT. WORTH, TX— Explaining that the costs of the service have grown too high in recent years, American Airlines announced Tuesday that it will no longer offer free cabin pressurization to passengers starting March 15. "Unfortunately, to stay competitive as a legacy carrier in today's air travel market, it no longer makes economic sense for us to provide breathable air at altitude," said American Airlines CEO Doug Parker, noting that despite the cutbacks, air pressurization would still be available to first- and business-class travelers as well as those willing to pay an additional fee. "While we regret any altitude sickness, blood problems, dimmed vision, or hyperventilation that

may result from air pressure less than a third normal levels, we remind our customers that such effects will diminish as soon as the aircraft descends below 10,000 feet." Parker added that the company is also planning to discontinue complimentary landing gear on flights under four hours.

The Onion (25 February, 2014)

<https://www.theonion.com/american-airlines-to-phase-out-complimentary-cabin-pres-1819576190>

Article 4:

Nutritionists Admit You Can Just Eat Hotdogs And Live Like That For Basically Decades

DENVER—Conceding that people can, in fact, survive indefinitely on a daily diet consisting solely of hotdogs, top nutritionists admitted Wednesday that you could just eat hotdogs and live for basically decades. "We put a lot of work into formulating dietary guidelines based on discoveries and advancements in the field of food science, but

honestly, if you just ate hotdogs three times a day every day, you'd be okay," said nutritionist Alison Lawler, noting begrudgingly that a supermarket hotdog contains sufficient proteins, carbohydrates, and minerals to sustain an average human well into their 80s. "You won't be healthy per se, but you'd last on hot dogs for years and years. You wouldn't feel great, you'd be a bit weak and tired, but that's about it. And you'd most likely be reasonably happy, because hot dogs are tasty and satisfying. Now, by no means are we recommending that you stock your pantry full of hot dogs, but we have to admit, that wouldn't be the end of the world." At press time, the nutritionists were not available for further comment as they had all gone out for hotdogs.

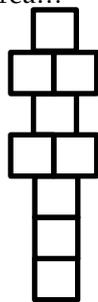
The Onion (20 July, 2020).

<https://www.theonion.com/nutritionists-admit-you-can-just-eat-hot-dogs-and-live-1844383727>

12. Sports

Sadiq Public School's curriculum is more than just academic subjects. This is one of the main ways that Sadiq Public School is so unique. We aim for all students to learn the value of team sports sportsmanship and good health through regular physical activity. You can learn some of these even while at home.

1. Choose 2-3 physical exercises and practice doing these every day. It may be press ups, step ups (walking up and down 3-4 stairs repeatedly), star-jumps, squats... You should do 2-3 of these every day for about 30 minutes every day. Early in the morning is probably better. You are aiming to make it a daily habit that you will still be doing when you're 50 years old. You can challenge yourself to do more each day or more in the 30 minute session. You can challenge your parents (but remember that they're very old and so be gentle with them).
2. Think of a skill-based physical activity that involves some coordination, such as juggling three balls or skipping rope. Now teach yourself how to do this. And when you're proficient, teach someone else. Why? Doing these things occupies your brain and that means you're not thinking about other things – so these activities become a good way to relax, distract your brain from things that are causing you stress (like exams!)
3. Ball games are good for reducing stress, and sneakily using up energy and so keeping you fit and healthy and helping you to sleep properly. If you have brothers and sisters at home you can ball games like mini-cricket, catching & throwing, bouncing a ball against a wall and catching it (who knows you may be selected as wicket-keeper for the 1st XI).
4. Hop-sotch. You might have to ask your parents how to play this. With chalk, draw a grid of 9 squares on a paved area...



Stand at the bottom of the grid. Each square has a number 1-9 in it (I can't draw the number with my computer, but you can with chalk.) Use a small stone and slide it first to the 1st square. Hopping, jump over the square with the stone in it, continue hopping up the grid in the correct order, turn around, hop back to the 2 square, bend down and pick up the stone (you're not to put your other foot on the ground otherwise it's too easy), and then back to the start. If you succeed, now slide the stone to the 2 square and hop away, and back, bend down pick up the stone, hop to the start... etc. If you miss the square with your stone, or you put your non-hopping foot down your turn has ended and the next player starts. Yes, parents can play too, but not your neighbours or your cousins who live in Lahore because they're staying home and staying safe. If you don't like my rules, make your own. But once you make the rules, no cheating.

13. Community service

Community service simply means serving our community – doing something to help the community. In the current situation we can all serve our community by staying at home / staying away from other people and washing our hands frequently with soap because when we do this we stop the virus being passed from one person to another. If we all do this, our whole community will be helped.

You can help the whole world's community by doing what you can to reduce plastic waste. You can do this by refusing plastic bags at shops. Make your own paper bags at home and take these to the shops and so not use plastic bags. Buy less (or even none) products that have plastic packaging. Glass can be recycled and so that's fine.

Bury biodegradable waste in your garden rather than send it by rubbish truck to a dump somewhere. Fruit, vegetable scraps, leftover food etc. will rot in your garden and so quickly convert back into soil and return nutrients to plants. Paper waste will do the same.

Turn off lights and other electricity-users when not needed and do not let water taps run needlessly.

Look for ways to help others. Practise saying, 'can I help you?' with family members and then helping will become part of who you are.

There is an interesting theory that the virus that has caused this current situation was passed to humans because animal habitats, especially forests, are being destroyed. Destroying forests, whether for the timber, for clearing land to use for agriculture, or simply to burn the wood as fuel, is called deforestation and it is the main cause of climate change. The next few pages will help you learn more about deforestation and its very bad effects on the planet and human life.

THERE IS ONLY ONE PLANET EARTH



Lesson 2. Deforestation

Deforestation is the removal of forest from land which is then converted to agricultural or urban use. Most deforestation occurs in tropical rainforests such as the Amazon Rainforest.

Between 2000 and 2012, about 890,000 square miles of forests around the world were cut down. Only about 2.4 million square miles of the Earth's original 6 million square miles of forest remains. An area about size of a football field is cleared from the Amazon rainforest every minute for agriculture.

Deforestation is a significant contributor to global warming because it is responsible for about 20% of all greenhouse gas emissions.

According to the UN's Food and Agriculture Organization, almost 80% of all deforestation is driven by agriculture. The UN Framework Convention on Climate Change says the primary cause of deforestation is agriculture.

Subsistence farming is responsible for almost half of all deforestation (48%), with commercial agriculture (32%; logging (14%), and fuel wood (5%) the other causes.

The EU is a major importer of agricultural products, such as palm oil, soy, and cocoa, products commonly associated with agricultural land that was recently forested land. EU countries are keen to reduce the impact of their commercial activities on forests and deforestation. France's government, for example, announced it will 'encourage every actor (producers, businesses, investors, and consumers), to change their practices in order to reduce deforestation.' The French government passed a law stating that palm oil is not considered a biofuel.

In 2008, the EU agreed to stop global forest cover loss by 2030. The UN declared a Sustainable Development Goal of ending deforestation by 2030.

THERE IS ONLY ONE PLANET EARTH

Which countries are worst affected by deforestation?

South & Central America

Large areas of Brazil's share of the Amazon rainforest is being destroyed by illegal logging, exacerbated by government corruption. Deforestation in Peru's share of the Amazon rainforest is due to illegal logging and clearing forests for use as agricultural land. Bolivia's large soya industry and cattle-ranching are the country's main causes of deforestation and the Bolivian government is unlikely to risk the country's food security. Mexico's avocado industry is responsible for the loss of tropical and pine forests.

Asia Pacific

Indonesia's palm oil industry has driven destruction of its rainforest and also its wetlands, with more than 5000 square miles cut down annually to supply palm oil. More than 2000 square miles of Russia's vast forests are lost to wildfires annually. Logging and the palm oil industry account for about 1000 square miles of trees lost in Papua New Guinea annually.

Africa

In Sudan, about 500 square miles of trees are cut down every year to be used as household cooking fuel and heating, and for commercial production of steam-generated electricity. Just 6% of Nigeria's original forests remain because of trees being cut for household cooking fuel and heating.

While these countries are where deforestation is occurring the most, all countries are affected by deforestation because it is a significant factor in global warming and therefore climate change.



Activities

1. Write the following words into your book and then write an explanation of the word.

deforestation
 agricultural
 rainforest
 greenhouse gas
 primary cause
 subsistence farming
 logging
 fuel wood
 palm oil
 sustainable
 corruption
 food security

2. Explain why deforestation is a problem for our environment.

3. Explain which countries/regions are most affected by deforestation.

4. Describe the main causes of deforestation.

5. Research: Explain how cutting a tree down contributes to green house gas emissions and therefore global warming.

6. Create: Write a letter to Bolivia's President asking for Bolivia's government to please stop deforestation.

7. Critical thinking: Describe how might you check this article to be sure it is accurate.

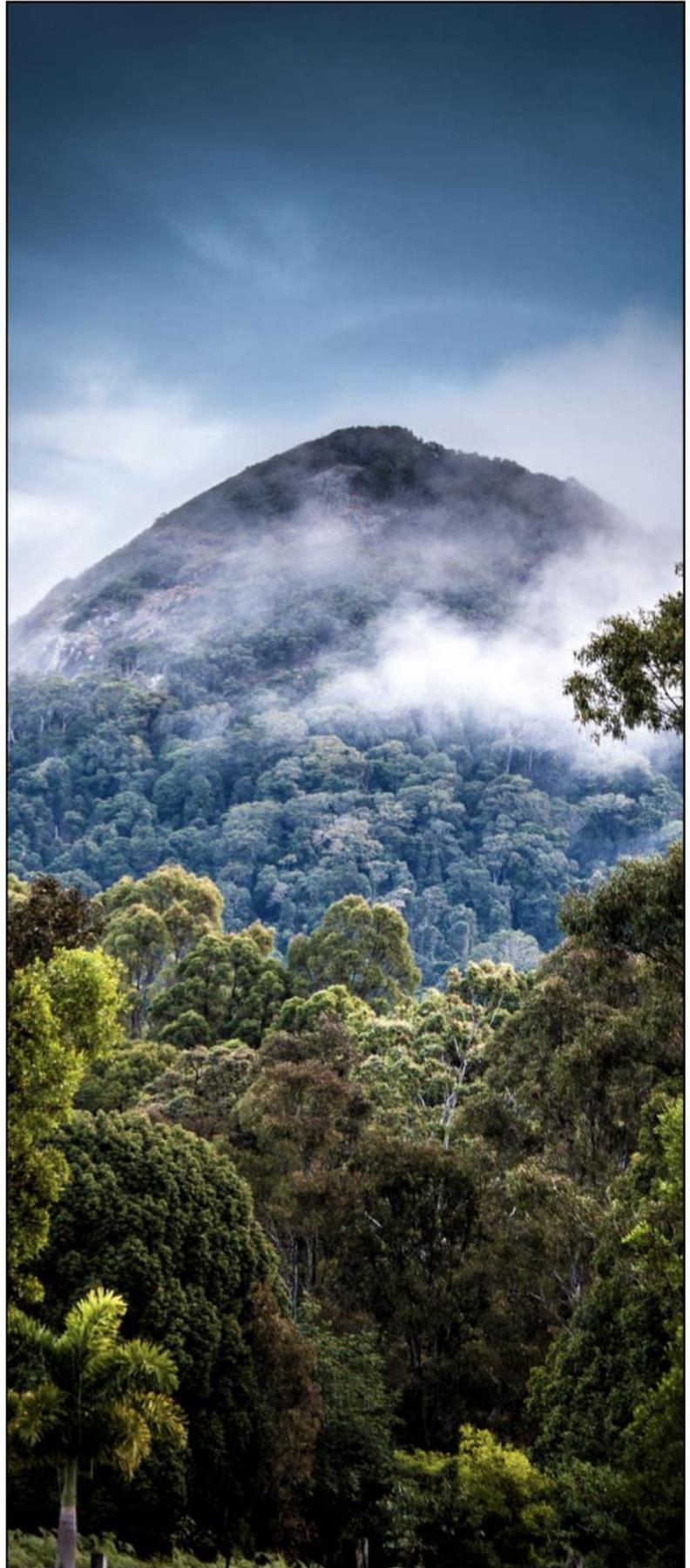
8. Reflect: List at least three things you learnt about deforestation from this material.

9. List 3 questions related to information in this article to which you would like answers. Describe how could you find the answers to your questions and how you can be sure they are accurate.

THERE IS ONLY ONE PLANET EARTH

What can I do?

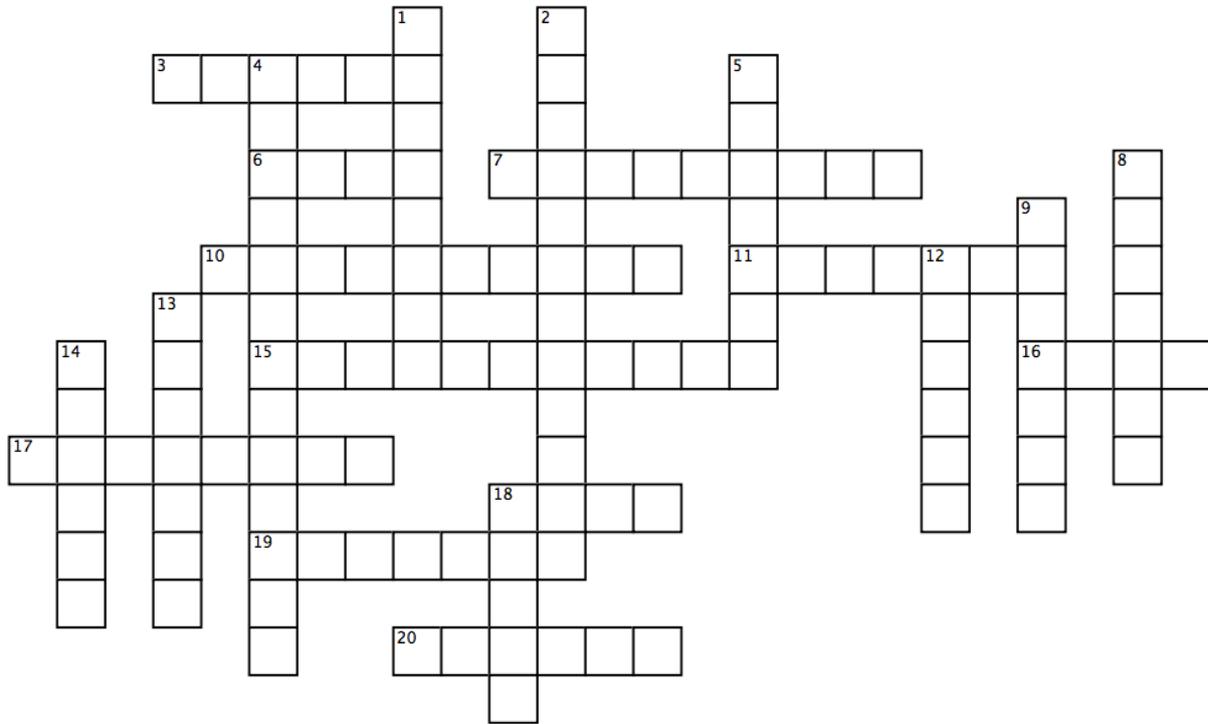
1. Learn more about the forests near where you live. Learn what plants and animals live in the forest. When you know about a forest, you will be more inclined to take care of it.
2. Ask your friends to visit a forest so they can learn about it. Is there anything you and your friends can do? Gathering plastic trash from the forest, for example.
3. Palm oil, soy, beef, and cocoa are the main agricultural products that are responsible for global deforestation. Use the internet to find out what products these ingredients are used to make, for example palm oil is used in the production of some low-quality chocolate and soap. Find out which companies use it and stop buying their products.
4. Write to the companies that use these products and tell them you have stopped buying their products because they are major causes of deforestation.
5. Use your social media accounts to tell your friends about deforestation, what its effects are, what causes it, and what they can do to help.
6. Send emails to government officials and tell them you do not want your country contributing to deforestation by buying these products.
7. Find a local organization that plants trees and help.
8. Grow seedlings and when they are big enough, plant them around your neighborhood. Encourage your teachers to start a program in your school in which students grow seedlings and plant them in an area that needs trees.



THERE IS ONLY ONE PLANET EARTH

Deforestation 1

Answer the crossword using information from the article.



Across

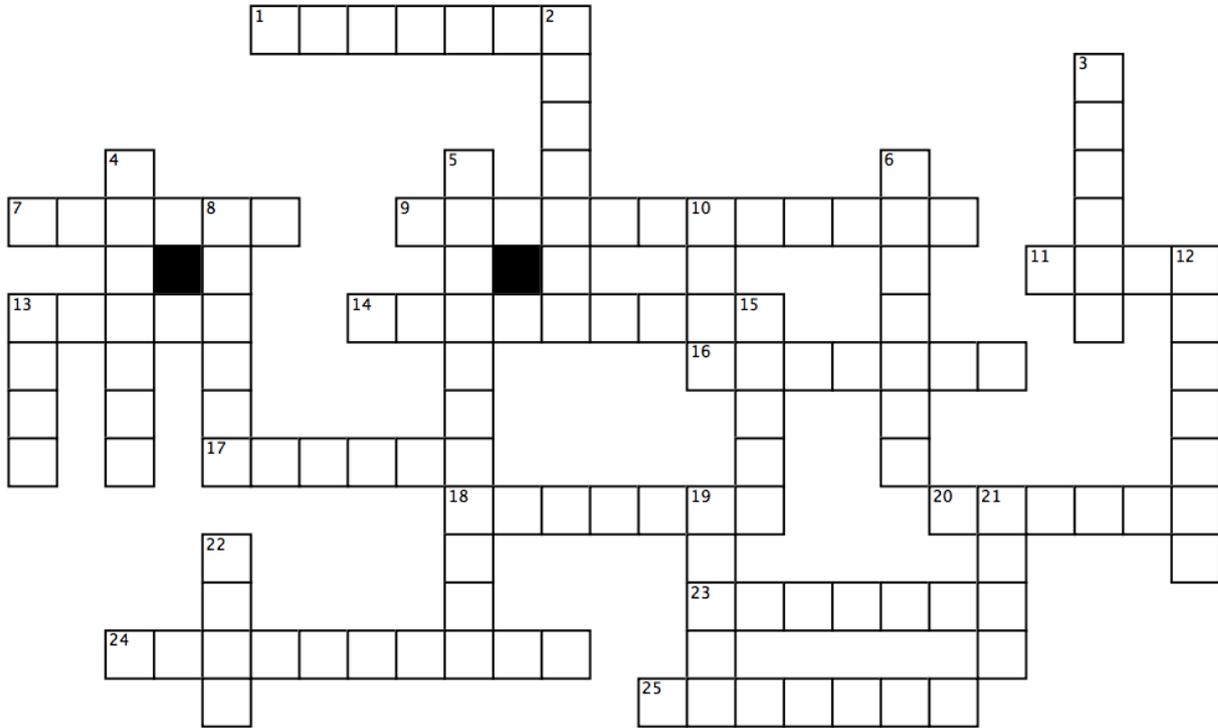
3. France’s government announced it will ‘encourage every actor (producers, businesses, investors, and consumers), to change their practices in order to _____ deforestation.’
6. In Sudan, trees are cut down to be used as household cooking _____ and heating, and for commercial production of steam-generated electricity.
7. More than 2000 square miles of Russia’s vast forests are lost to _____ annually.
10. Deforestation is responsible for about 20% of all _____ gas emissions.
11. Mexico’s _____ industry is responsible for the loss of tropical and pine forests.
13. _____ farming is responsible for almost half of all deforestation.
16. The UN declared a Sustainable Development _____ of ending deforestation by 2030.
17. An area about size of a _____ field is cleared from the Amazon rainforest every minute for agriculture.
18. The French government passed a law stating that _____ oil is not considered a biofuel.
19. Deforestation in Peru’s share of the Amazon rainforest is due to _____ logging and clearing forests for use as agricultural land.
20. Only about 2.4 million _____ miles of the Earth’s original 6 million _____ miles of forest remains.

Down

1. Indonesia’s palm oil industry has driven destruction of its rainforest and also its _____.
2. The EU is a major importer of _____ products, such as palm oil, soy, and cocoa.
4. _____ is the removal of forest from land which is then converted to agricultural or urban use.
5. All countries are affected by deforestation because it is a significant factor in global warming and therefore _____ change.
8. The _____ cause of deforestation is agriculture.
9. Large areas of Brazil’s share of the Amazon rainforest is being destroyed by illegal _____, exacerbated by government corruption.
12. Most deforestation occurs in tropical rainforests such as the _____ Rainforest.
13. Just 6% of Nigeria’s original forests remain because of trees being cut for household cooking fuel and _____.
14. Deforestation is a significant contributor to _____ warming.
18. Logging and the palm oil industry account for about 1000 square miles of trees lost in _____ New Guinea annually.



Deforestation 2

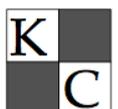


Across

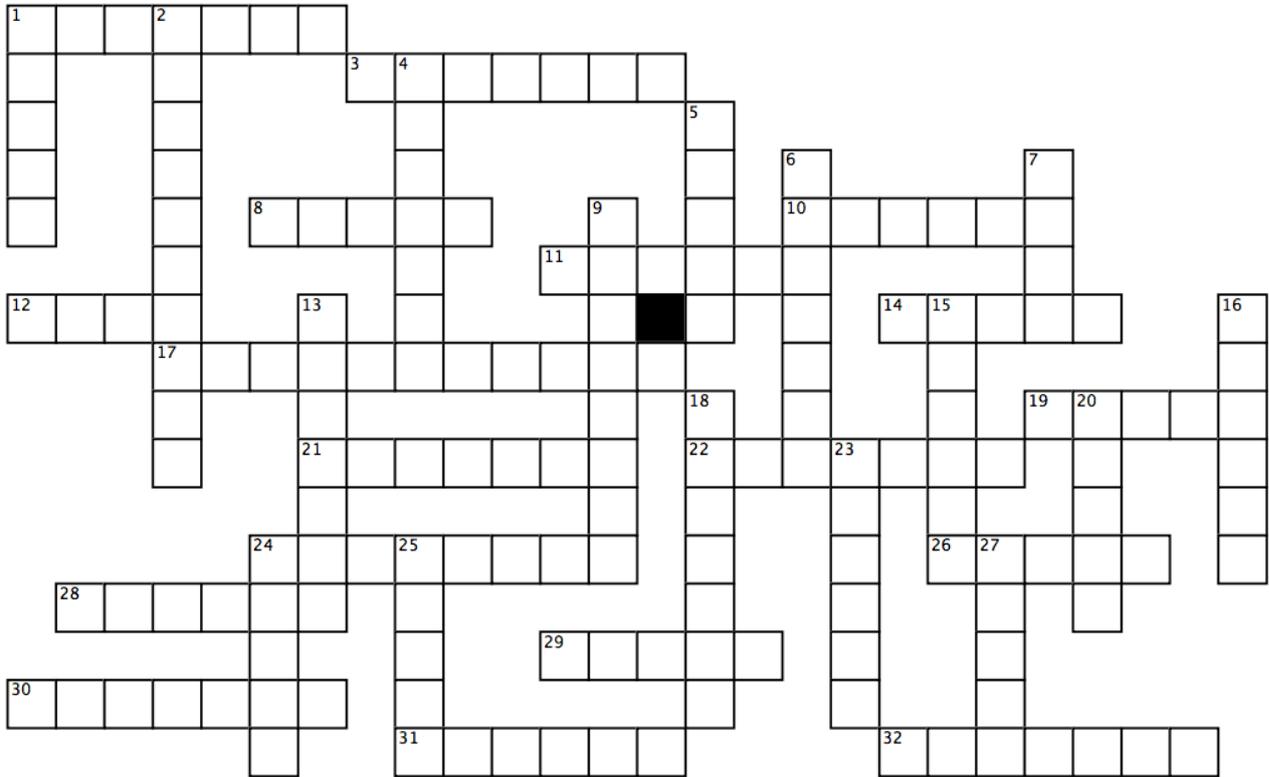
1. 80% of all land _____ and plants live in forests.
7. Forests absorb greenhouse gases that would otherwise fuel _____ warming.
9. Deforestation occurs because people clear forested land to make space for _____ activities such as cattle ranching.
11. Forests keep the _____ moist by blocking the sun and inhibiting evaporation.
13. Cutting down _____ releases carbon dioxide into the atmosphere.
14. Deforestation of tropical rainforests adds more carbon dioxide to the atmosphere than all cars' and trucks' _____.
16. Forests absorb carbon _____ and release oxygen.
17. _____ has the largest area of land deforested.
18. Most deforestation occurs in rainforests which are concentrated in the _____.
20. Deforestation results in more than 1.5 billion tons of _____ dioxide being released into the atmosphere every year.
23. Forests absorb and store carbon, so that when trees are cut down, the carbon is released into the atmosphere contributing to the greenhouse effect which causes global warming which causes _____ change.
24. If the current rate of deforestation continues, 100 years from now there will be no more _____.
25. Deforestation occurs because people take wood for household fuel and _____.

Down

2. Forests are home to millions of plant and animal _____.
3. The _____ rainforest is one of the Earth's most threatened forests.
4. _____ are one of the main natural factors that regulate and determine the Earth's climate.
5. _____ is one of the most significant causes of deforestation.
6. Deforestation is the main cause of global _____ and therefore climate change.
8. Deforestation has a double effect: it releases carbon dioxide and there are less trees to _____ carbon dioxide.
10. Forests cover a large proportion of the world's _____ area, but large areas of forest are being lost each year.
12. Deforestation is caused by household fuel burning, agriculture, and unsustainable _____.
13. Deforestation is the loss of _____ cover, due to forests being cleared.
15. Forests are called 'carbon _____' because they trap or hold carbon.
19. Forests play a significant role in the water _____ by releasing water vapor into the atmosphere.
21. Although Brazil has lost the largest _____ of forest, Comoros has lost 50% of its forests.
22. Forests prevent _____ erosion.



Brazil



Across

1. Early sailors often called Brazil Terra di Papaga (Land of _____).
3. Rio de Janeiro is home to two well known _____, the Ipanema and the Copacabana.
8. The predominant religion throughout Brazil is _____ Catholic.
10. Brazil has been the world's largest producer of _____ for more than 150 years.
11. The Alchemist, by the Brazilian author Paulo _____ de Souza, has sold over 83 million copies, and so is one of the most sold books ever.
12. Brazil spans _____ time zones.
14. Sao _____ is the most populous city in the southern hemisphere.
17. Brazil's Itaipu Dam generates the most _____ - of all the world's hydroelectric plants.
19. In the 16th century Brazil's major export was _____, but in the 17th century it was gold.
21. Brazil is the largest country in South _____.
22. Rio de Janeiro hosted the 2016 _____ Games and 2016 Paralympic Games.
24. In September 1822 Brazil declared independence from _____ and declared Prince Pedro de Alcântara the first Emperor of the Brazilian Empire.
26. Most Brazilians _____ Portuguese.
28. The Iguazu Falls are on the Brazil-Argentina _____.
29. The Amazon River _____ includes the vast Amazon rainforest.
30. Brasilia was planned and developed in 1956 to move the capital from Rio de _____ to a more central location.
31. Deforestation of the _____ rainforest has a double-effect on the greenhouse effect and therefore climate change: living trees store CO2 and dead trees release CO2 into the atmosphere.
32. In 2014-2016 a severe _____, caused by El Nino, had a significant impact on Sao Paulo and Rio de Janeiro.

Down

1. In 1831, Brazil's Emperor, Pedro I abdicated, returned to Portugal, and passed the monarchy to his five year old son, _____ II who was eventually crowned in 1841.
2. The Amazon _____ has the greatest biological diversity in the world.
4. Brazil is the only country with the _____ and the Tropic of Capricorn running through it.
5. The final of the 2014 football _____ Cup was played at the Maracana Stadium in Rio de Janeiro
6. Brazil's _____ is eighth-largest by GDP.
7. Brazil's currency, the _____, is pegged to the US dollar.
9. Brazil's national sport is _____ and the men's national team has won the World Cup 5 times.
13. Brazil borders all South American countries except _____ and Chile.
15. Brazil remained neutral in World War 2 until 1942, at which time it joined the _____.
16. The _____ the Redeemer statue overlooking Rio de Janeiro is 30 metres tall and was built in 1931.
18. The Amazon basin includes land in Brazil as well as _____, Colombia, Ecuador, Guyana, Peru, Suriname, and Venezuela.
20. 85% of Brazil's population live in _____ areas.
23. The Christ the Redeemer statue overlooking Rio de Janeiro is 30 _____ tall and was built in 1931.
24. In 1500 _____ Alvares Cabral claimed the area of Brazil for the Portuguese Empire and it remained a Portuguese colony until 1808.
25. Brazil's original official name was _____ da Santa Cruz (Land of the Holy Cross).
27. Brazil's capital city is Brasilia, but the largest city is Sao _____.