

## Word Puzzles

from Nelson Science Perspectives 10

## Cells and Cell Theory

## Across

1 a broad group of diseases that result in uncontrolled cell division
6 the third phase of mitosis, in which the centromere splits and sister chromatids separate into daughter chromosomes, and each moves towards opposite ends of the cell
8 a cell structure that performs a specific function for the cell
9 the stage of the cell cycle in which the DNA in the nucleus is divided; the first part of cell division
13 the process of producing offspring from only one parent; the production of offspring that are genetically identical to the parent (2 words)
17 a theory that all living things are made up of one or more cells, that cells are the basic unit of life, and that all cells come from pre-existing cells (2 words)
19 a transport mechanism for moving chemicals into and out of the cell, from an area of higher concentration to an area of lower concentration

## Down

2 the amount of a substance present in a given volume of solution
3 the material in the nucleus of a cell that contains all of the cell's genetic information
4 one of two genetically identical, new cells that result from the division of one parent cell (2 words)
5 a tumour that does no affect surrounding tissues other than by physically crowding them (2 words)
7 the process of producing offspring by the fusion of two gametes; the reproduction of offspring that have genetic information from each parent (2 words)
10 a cell that can perform a specific function (2 words)
11 any environmental factor that causes cancer
12 a tumour that interferes with the functioning of surrounding cells; a cancerous tumour (2 words)
14 the three stages through which a cell passes as it grows and divides (2 words)
15 the structure that holds chromatids together as chromosomes
16 one of two identical strands of DNA that make up a chromosome
18 the movement of a fluid, usually water, across a membrane toward an area of high solute concentration


## Animal Systems

## Across

5 an organizational structure, with more complex or important things at the top and simpler or less important things below

7 a thick-walled blood vessel that carries blood away from the heart
10 a thin sheet of tightly packed cells that covers body surfaces and lines internal organs and body cavities (2 words)
11 a collection of similar cells that perform a particular, but limited, function

13 a blood vessel that returns blood to the heart

15 the organ system that is made up of the heart, the blood, and the blood vessels; the system that transports oxygen and nutrients throughout the body and carries away wastes (2 words)
16 a specialized tissue that provides support and protection for various parts of the body (2 words)

## Down

1 the organ system that is made up of the brain, the spinal cord, and the peripheral nerves; the system that senses the environment and coordinates appropriate responses (2 words)
2 a structure composed of different tissues working together to perform a complex body function

3 the organ system that is made up of the mouth, esophagus, stomach, intestines, liver, pancreas, and gall bladder; the system that takes in, breaks up, and digests food and then excretes the waste (2 words)

4 the process by which a cell becomes specialized to perform a specific function (2 words)

6 tiny sac of air in the lungs that is surrounded by a network of capillaries; where gas exchange takes place between air and blood

8 the organ system that is made up of the nose, mouth, trachea, bronchi, and lungs; the system that provide oxygen for the body and allows carbon dioxide to leave the body (2 words)

9 specialized tissue that conducts electrical signals from one part of the body to another (2 words)
12 a group of specialized tissues containing proteins that can contract and enable the body to move (2 words)

14 a system of one or more organs and structures that work together to perform a major vital body function such as digestion or reproduction (2 words)



## Plant Systems

## Across

5 the tissues responsible for conducting materials within a plant (3 words)

6 an opening in the surface of a leaf that allows the exchange of gases

7 vascular tissue in plants that transports water and dissolved minerals from the roots to the leaves and stems of the plant

12 vascular tissue in plants that transports dissolved food materials and hormones throughout the plant
13 all plant tissues other than those that make up the dermal and vascular tissue systems (3 words)

## Down

1 one of a pair of special cells in the epidermis that surround and control the opening and closing of each stomate (2 words)

2 undifferentiated cells under the bark in the stems and roots of woody plants; cells that divide, enabling the plant to grow wider and develop specialized tissues in the stem (2 words)

3 a method of growing many identical offspring by obtaining individual plant cells from one parent plan, growing these cells into calluses, and then into whole plants (3 words)
4 the tissues covering the outer surface of the plant (3 words)
8 an undifferentiated plant cell that can divide and differentiate to form specialized cells (2 words)
9 a layer of tall, closely packed cells containing chloroplasts, just below the upper surface of a leaf; a type of ground tissue (2 words)
10 a region of loosely packed cells containing chloroplasts, in the middle of a leaf; a type of ground tissue (2 words)

11 a thin layer of cells covering all non-woody surfaces of a plant (2 words)


## Cells \& Animal \& Plant Systems

## Across

2 the movement of a fluid, usually water, across a membrane toward an area of high solute concentration

5 an opening in the surface of a leaf that allows the exchange of gases
6 the tissues covering the outer surface of the plant (3 words)

7 the organ system that is made up of bones and skeletal muscle; the system that supports the body, protects delicate organs, and makes movement possible (2 words)
9 the part of the nervous system consisting of the brain and the spinal cord (3 words)
10 the process in which a plant produces genetically identical offspring from its roots or shoots (2 words)

12 the organ system that is made up of the nose, mouth, trachea, bronchi, and lungs; the system that provide oxygen for the body and allows carbon dioxide to leave the body (2 words)

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18 the organ system that is made up of the heart, the blood, and the blood vessels; the system that transports oxygen and nutrients throughout the body and carries away wastes (2 words)
19 the process of producing offspring from only one parent; the production of offspring that are genetically identical to the parent (2 words)

21 the process of producing offspring by the fusion of two gametes; the reproduction of offspring that have genetic information from each parent (2 words)

22 a cell that does not contain a nucleus or other membrane-bound organelles
23 the technology of using light energy to diagnose, monitor, and treat living cells and organisms
24 the organ system that is made up of the brain, the spinal cord, and the peripheral nerves; the system that senses the environment and coordinates appropriate responses (2 words)

## Down

1 the stage of the cell cycle in which the DNA in the nucleus is divided; the first part of cell division

3 the structure that holds chromatids together as chromosomes

4 the process by which a cell becomes specialized to perform a specific function (2 words)

8 a structure composed of different tissues working together to perform a complex body function

11 a blood vessel that returns blood to the heart
13 a thin sheet of tightly packed cells that covers body surfaces and lines internal organs and body cavities (2 words)

14 a tumour that interferes with the functioning of surrounding cells; a cancerous tumour (2 words)

17 a theory that all living things are made up of one or more cells, that cells are the basic unit of life, and that all cells come from preexisting cells (2 words)
20 the material in the nucleus of a cell that contains all of the cell's genetic information


## Cells \& Animal \& Plant Systems

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18 a collection of similar cells that perform a particular, but limited, function
21 vascular tissue in plants that transports water and dissolved minerals from the roots to the leaves and stems of the plant
22 the process of producing offspring from only one parent; the production of offspring that are genetically identical to the parent (2 words)

23 an undifferentiated plant cell that can divide and differentiate to form specialized cells (2 words)

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1 a nerve cell
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14 the organ system that is made up of bones and skeletal muscle; the system that supports the body, protects delicate organs, and makes movement possible (2 words)
17 specialized tissue that conducts electrical signals from one part of the body to another (2 words)

18 a mass of cells that continue to grow and divide without any obvious function in the body
19 one of a pair of special cells in the epidermis that surround and control the opening and closing of each stomate (2 words)
20 the movement of a fluid, usually water, across a membrane toward an area of high solute concentration


## Cells and Cell Theory

E. the third phase of mitosis, in which the centromere splits and sister chromatids separate into daughter chromosomes, and each moves towards opposite ends of the cell
... the process of producing offspring from only one parent; the production of offspring that are genetically identical to the parent
E. a tumour that does no affect surrounding tissues other than by physically crowding them
E. the technology of using light energy to diagnose, monitor, and treat living cells and organisms

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E. any environmental factor that causes cancer
… the three stages through which a cell passes as it grows and divides
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\#.. the structure that holds chromatids together as chromosomes
-. one of two identical strands of DNA that make up a chromosome
E. a structure in the cell nucleus made up of a portion of the cell's DNA, condensed into a structure that is visible under a light microscope
... the amount of a substance present in a given volume of solution
... the stage in the cell cycle when the cytoplasm divides to form two identical cells; the final part of cell division
... one of two genetically identical, new cells that result from the division of one parent cell
E. a transport mechanism for moving chemicals into and out of the cell, from an area of higher concentration to an area of lower concentration
... the material in the nucleus of a cell that contains all of the cell's genetic information
. .. a cell that contains a nucleus and other organelles, each surrounded by a thin membrane
|.. . the phase of the cell cycle during which the cell performs its normal functions and its genetic material is copied in preparation for cell division
V. a tumour that interferes with the functioning of surrounding cells; a cancerous tumour
E.I. the second stage of mitosis, in which the chromosomes line up in the middle of the cell
… the process of cancer cells breaking away from the original tumour and establishing another tumour elsewhere in the body
... the stage of the cell cycle in which the DNA in the nucleus is divided; the first part of cell division
.|. a random change in the DNA
… a cell structure that performs a specific function for the cell
. membrane toward an area of high solute concentration
\#. a test that involves taking a sample of cervical cells to determine if they are growing abnormally
. . a cell that does not contain a nucleus or other membrane-bound organelles
II. the first stage of mitosis, in which the chromosomes become visible and the nuclear membrane dissolves

III the process of producing offspring by the fusion of two gametes; the reproduction of offspring that have genetic information from each parent
II. the final phase of mitosis, in which the chromatids unwind and a nuclear membrane reforms around the chromosomes at each end of the cell
.|. a mass of cells that continue to grow and divide without any obvious function in the body

X N C E N T R OME R E E V H Z K C K I M N K E S A H P O L E T L E G K B Z V C EOS I S EN I K O T Y C S X S TXC Z T I N W F B N C U M D A Y A F Y S I H B A T R E T K H K E O G L CHUP E N R Z S C O B G K K X S K U F L P D A T O OM T U D G E O T P O F C F L O O D P S M U A D W A H N N U U C I O E R U S A M A W S O O F M Y I I M G H I C P L P P O T O I R D B A S B G CO L R I O G O N S I O S P K E L I M T N R U T OOOOO I D Z Z E E R I R Z E D T A R Y M I H X S C P N R E X G E O N A K U C M T O H W A Y O O L T T N X S L U U M M A P A S N N V I I A O N A U C A G I H T O N E CO I A N T U Y A N K I G H X U N D U E T R M I T A X R N T V N P T M Y D Y R R T M A E E R E A A T O O E E O D I F F U S I O N R T S K P U U T S R E T O Y R A K O R P P N A U H M Y O E C Y R O E H T L L E C H E B E A O G H U E O R G A N E L L E B A C V L S U F P X L C I P Y R F N I Z V S N G D E R V O Z L D Y M L Z Z W Y O S E O V H M G S I S O T I M Z Z K R S R V O C P M B I K B M E T A P H A S E P N E M

## Animal Systems

|. . tiny sac of air in the lungs that is surrounded by a network of capillaries; where gas exchange takes place between air and blood
… a thick-walled blood vessel that carries blood away from the heart
I. a tiny, thin-walled blood vessel that enables the exchange of gases, nutrients, and wastes between the blood and the body tissues
… the process by which a cell becomes specialized to perform a specific function
*. . the part of the nervous system consisting of the brain and the spinal cord
… the organ system that is made up of the heart, the blood, and the blood vessels; the system that transports oxygen and nutrients throughout the body and carries away wastes
. protection for various parts of the body
... the organ system that is made up of the mouth, esophagus, stomach, intestines, liver, pancreas, and gall bladder; the system that takes in, breaks up, and digests food and then excretes the waste
\#. . a diagnostic test that measures the electrical activity pattern of the heart through its beat cycle
I. a thin sheet of tightly packed cells that covers body surfaces and lines internal organs and body cavities
". an organizational structure, with more complex or important things at the top and simpler or less important things below

- . . a group of specialized tissues containing proteins that can contract and enable the body to move
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I. . the part of the nervous system consisting of the nerves that connect the body to the central nervous system
|. . the organ system that is made up of the nose, mouth, trachea, bronchi, and lungs; the system that provide oxygen for the body and allows carbon dioxide to leave the body
. .. a collection of similar cells that perform a particular, but limited, function
\#. a blood vessel that returns blood to the heart
.. the process of transplanting an organ or tissue from one species into another

M N K Y I I M E X I M P P L W I B U G O EM O S F E I Z F E T Z W S K A E R D E T L R W G I N H T Y F A L V E O L U S G T I T S N R W I S C F I D T S M OM L C P Z B I Y C L O S D O X C A V M T F V R R Z E B I D C P D H E OM B Y W E P L O S M A R G E G T Z R G A B V I L R U P B S I I S Z I K O W I S I S P C F V R A V L G Z P Y L E S G F V S V Y V P Z Y E U I O P I G U A H S L H I V V W N E F H T I R S R L Y I Z M E L N O A A G C P I P F G I E F R H S I A W E R U L A G R I R D O R N T L G U N A A M U P T N I T S E R Y X Y K R D E A D S S D D R T E O H O O G Y C C D D F K E W U N H R S E M Z O O T V E R I M O U T I R U I X R M M O I E S G B R R S R R Y T M W L R F I C N O T M O T Z F I P I H Y Y E A S A Z G O O F N V N G T S D I A W E H C D S S N L Y T W E S C E F K U U R E X S Y B I OM I Y S I N S N S X K A R O P T R N E I D V K N U R C S U T E T A R B E R E Z R I R K I N I K N S F N O T O O R E L H N L D N K H S Z I I T O E C G X N R E V R V M P C O E I T F O I W H C O C L V Y M Y G M R I OM S K H T O I P U Y M A P T E Z Z R V O A A E G U G N P N A G A K O H S L I T Y G F E N D N I N O S M A R T L R T H Z C C V I W B I W T H K S S L F S U R T Z S A I R W D E S T W O W L R Z B Y U A X Y Z T R F Y M O I H T S O L T W O I A I K S I R I S R O U I S K N P I U B L F C X L I M Z Y T B T I T A N W G T O V S E W N E R V E T I S S U E S N A E N E I Z E L S S B C U M X I Z N I G G UM Z E F M O X P K M U W K L M R I U R V O L H S L Y G C H O T N V O E P I THELIALTIS S UE P

## Plant Systems

H. undifferentiated cells at the tips of plant roots and shoots; cells that divide, enabling the plant to grow longer and develop specialized tissues
H. a layer of wax on the upper and lower surfaces of a leaf that blocks the diffusion of water and gases
.I. the tissues covering the outer surface of the plant
I. a thin layer of cells covering all nonwoody surfaces of a plant
-. all plant tissues other than those that make up the dermal and vascular tissue systems
… one of a pair of special cells in the epidermis that surround and control the opening and closing of each stomate
. I. undifferentiated cells under the bark in the stems and roots of woody plants; cells that divide, enabling the plant to grow wider and develop specialized tissues in the stem
\#. . an undifferentiated plant cell that can divide and differentiate to form specialized cells
… a layer of tall, closely packed cells containing chloroplasts, just below the upper surface of a leaf; a type of ground tissue
". - tissue on the surface of a plant that produces bark on stems and roots
. - vascular tissue in plants that transports dissolved food materials and hormones throughout the plant
. . the system in a flowering plant, fern, or conifer that anchors the plant, absorbs water and minerals, and stores food
: . the system in a flowering plant that is specialized to conduct photosynthesis and reproduce sexually; it consists of the leaf, the flower, and the stem

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## Cells \& Animal \& Plant Systems

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I. a blood vessel that returns blood to the heart
\#. vascular tissue in plants that transports water and dissolved minerals from the roots to the leaves and stems of the plant

M A L I G N A N T T U M O U R I E M D N O Z C T S E T P A P U Z E M S N X X I E N K B X N Y U E M H G X F C P E I K T C A G I T L E L L E N A G R O O O S T U E M O S OM O R H C E O N O T I S S U E E K I P L I I S S S E I P M N S W I O A N T Y D A N A P H A S E M D O T U I Y C V B A E N X N G S T T M E T S I R E M L A C I P A A G T S U V E L T E L E K E A R P T R K L Z I M E O L H P I I N L E L C N I S C T R C W Z A M P M E T S Y S T O O R E W T O A V O N I S Y T A V M V X L T R I S U L O E V L A R C L N I M I S D G A S I K O E Z R N V O E U S S I T E V R E N L E T R T K X N D N V S U T I H E D P G U A R D C E L L G M E R C E S E E T E A E I S S B C R E H I G O D U S R S C C L C E U D E L C U L G T S S Y C I V R A P R N T F O I Y E T A R F D I G E OMAR I A Y S R R O M S U O I Y L Z L N I U T E F O P I T N O Y O S T S E A C U A E V C O A V P T M N M E T I R E D A C U E I S S T U M U S L I L I H OM R I S T O R H D P E M L E R R M U A E S E L S T E M G W E O D T D W U A G R E S Y S N P B H E T M S T A Y I O U S L M V O F K H R L U A R A C Y T O K I N E S I S T S S S H Y E N M Z C A S R M A L L H K S R D Y Z T M I T Y O T S M X R L A E E V O E D E D U A P D T A D R I R U G D S R E U O E E T E L U Z E I H R G L U A G E T W E M P T U N Y Y M E S B E T L U W R F I D I E L X T Z M I R T S A H E U R S I S I A HCOW K F OMN S I E E E B O O P R W V R W O O Y O Y S O Y N Y Y U A U N T T M C S M E E N O A M G B R R T S O S Z C G M E S R T R E M E A B A H K I W B P Z N R P G A T X T L C B O I G A A L Y S M C L L E C C I T A M E T S I R E M E Y W E O G T O O K N O A W S G Y R O E H T L L E C O I M E M P D N O I N P N U O P T I B I O P H O T O N I C S D P M T R C Z W O U H P W I I R S E E M L M E T S Y S T O O H S R F B A O N V A F C X L C O P E L L E S A H P R E T N I O E I C T W S H S N C O L S T R M U S C L E T I S S U E O Z C R R I A Y I E H B B A O I H W A R A L D I T A M O R H C N A G R O B B F O P O R Y M Z Z P X C I I O C X D P X F L A B R W B I N L I L E Y F E U S S I T L A I L E H T I P E C V F Y B N P M A R G O I D R A C O R T C E L E V E O H I E R A R C H Y U


## Chemicals and Their Properties

## Across

5 a compound made up of one or more positive metal ions (cations) and one or more negative non-metal ions (anions) (2 words)

6 a pure substance formed from two or more non-metals (2 words)

8 an ion made up of more than one atom that acts as a single particle (2 words)
9 the elements in the seventeenth column of the periodic table (Group 17)
11 a compound that separates into ions when it dissolves in water, producing a solution that conducts electricity

12 a charged particle that results when an atom gains or loses one or more electrons

13 a pure substance composed of one or more elements in a fixed ratio

14 a description of a substance that does not involve forming a new substance; for example, colour, texture, density, smell, solubility, taste, melting point, and physical state (2 words)
16 a description of what a substance does as it changes into one or more new substances (2 words)

## Down

1 a pure substance that cannot be broken down into simpler substances

2 a positively charged ion
3 a negatively charged ion
4 a model representing the arrangement of electrons in orbits around the nucleus of an atom (2 words)
7 a molecule consisting of only two atoms of either the same or different elements (2 words)
10 the elements (except hydrogen) in the first column of the periodic table (Group 1) (2 words)
15 a row of elements in the periodic table



## Chemicals and Their Reactions

## Across

4 a symbol indicating the physical state of the chemical at room temperature (2 words)

12 the statement that, in any given chemical reaction, the total mass of the reactants equals the total mass of the products (5 words)
13 the breakdown of a metal resulting from reactions with chemicals in its environment

## Down

1 a reaction in which two reactants combine to make a larger or more complex product; general pattern: A + B $\rightarrow$ AB (2 words)

2 a reaction that occurs when elements in different compounds displace each other or exchange places, producing two new compounds; general pattern $\mathrm{AB}+\mathrm{CD} \rightarrow \mathrm{AD}+\mathrm{CB}$ (3 words)
3 a combustion reaction of hydrocarbons that may produce carbon monoxide, carbon, carbon dioxide, soot, water, and energy; occurs when the oxygen supply is limited (2 words)

5 a way of describing a chemical reaction using the names of the reactants and products (2 words)

6 a process in which substances interact, causing the formation of new substances with new properties (2 words)
7 a reaction in which a large or more complex molecule breaks down to form two (or more) simpler products; general pattern: $A B \rightarrow A+B$ (2 words)
8 a combustion reaction of hydrocarbons that uses all the available fuel and produces only carbon dioxide, water, and energy; occurs when the supply of oxygen is plentiful (2 words)
9 a solid formed from the reaction of two solutions

10 a chemical, present at the start of a chemical reaction, that is used up during the reaction

11 a way of describing a chemical reaction using the chemical formulas of the reactants and products (2 words)


## Acids and Bases

## Across

2 a numerical scale ranging from 0 to 14 that is used to compare the acidity of solutions (2 words)
3 neither acidic nor basic; with a pH of 7
6 an aqueous solution that conducts electricity and turns red litmus blue

9 any precipitation with a pH of less than the normal pH of rain, which is approximately 5.6 (2 words)
11 a measure of how acidic or basic a solution is

## Down

1 a chemical reaction in which an acid and a base react to form an ionic compound (a salt) and water; the resulting pH is closer to 7 (2 words)

4 a substance that changes colour depending on whether it is in an acid or a base (2 words)

5 the ability of a substance to resist changes in pH (2 words)
7 the process of removing heavy metals from contaminated soils by adding an acid solution to the soil and catching the solution that drains through (2 words)

8 the process in which acid-forming pollutants fall directly to Earth in the dry state (2 words)
10 an aqueous solution that conducts electricity, tastes sour, turns blue litmus red, and neutralizes bases


## Chemistry

## Chemical Properties \& Reactions

## Across

1 a pure substance formed from two or more non-metals (2 words)

5 an ion made up of more than one atom that acts as a single particle (2 words)
7 the simultaneous strong attraction of positive and negative ions in an ionic compound (2 words)
8 a combustion reaction of hydrocarbons that uses all the available fuel and produces only carbon dioxide, water, and energy; occurs when the supply of oxygen is plentiful (2 words)
10 a chemical reaction in which an acid and a base react to form an ionic compound (a salt) and water; the resulting pH is closer to 7 (2 words)
11 the elements (except hydrogen) in the first column of the periodic table (Group 1) (2 words)
12 a reaction in which two reactants combine to make a larger or more complex product; general pattern: $A+B \rightarrow A B$ (2 words)
18 a combustion reaction of hydrocarbons that may produce carbon monoxide, carbon, carbon dioxide, soot, water, and energy; occurs when the oxygen supply is limited (2 words)
19 any precipitation with a pH of less than the normal pH of rain, which is approximately 5.6 ( 2 words)

20 a reaction in which a large or more complex molecule breaks down to form two (or more) simpler products; general pattern: $A B \rightarrow A+B$ (2 words)

## Down

2 the elements in the second column of the periodic table (Group 2) (3 words)

3 a substance that changes colour depending on whether it is in an acid or a base (2 words)

4 a reaction that occurs when elements in different compounds displace each other or exchange places, producing two new compounds; general pattern: $A B+C D \rightarrow A D+C B$ (3 words)

6 a charged particle that results when an atom gains or loses one or more electrons

9 a symbol indicating the physical state of the chemical at room temperature (2 words)
13 a positively charged ion
14 a chemical, present at the start of a chemical reaction, that is used up during the reaction

15 a pure substance composed of one or more elements in a fixed ratio

16 a negatively charged ion
17 a column of elements in the periodic table with similar properties

21 a measure of how acidic or basic a solution is

22 an aqueous solution that conducts electricity, tastes sour, turns blue litmus red, and neutralizes bases


## Chemical Properties \& Reactions

## Across

5 neither acidic nor basic; with a pH of 7
7 a compound that separates into ions when it dissolves in water, producing a solution that conducts electricity
11 a measure of how acidic or basic a solution is

12 an aqueous solution that conducts electricity, tastes sour, turns blue litmus red, and neutralizes bases
15 an aqueous solution that conducts electricity and turns red litmus blue
17 a chemical reaction in which an acid and a base react to form an ionic compound (a salt) and water; the resulting pH is closer to 7 (2 words)
20 a negatively charged ion
21 a pure substance that cannot be broken down into simpler substances

22 a row of elements in the periodic table

24 a pure substance formed from two or more non-metals (2 words)

## Down

1 the breakdown of a metal resulting from reactions with chemicals in its environment

2 the ability of a substance to resist changes in pH (2 words)

3 a way of describing a chemical reaction using the chemical formulas of the reactants and products (2 words)

4 a reaction in which a large or more complex molecule breaks down to form two (or more) simpler products; general pattern: $A B \rightarrow A+B$ (2 words)
6 a reaction in which two reactants combine to make a larger or more complex product; general pattern: $A+B \rightarrow A B$ (2 words)
8 a description of what a substance does as it changes into one or more new substances (2 words)
9 any precipitation with a pH of less than the normal pH of rain, which is approximately 5.6 ( 2 words)
10 a substance that changes colour depending on whether it is in an acid or a base (2 words)
13 the process of removing heavy metals from contaminated soils by adding an acid solution to the soil and catching the solution that drains through (2 words)
14 a process in which substances interact, causing the formation of new substances with new properties (2 words)
16 the elements in the second column of the periodic table (Group 2) (3 words)

18 a numerical scale ranging from 0 to 14 that is used to compare the acidity of solutions (2 words)
19 a positively charged ion
23 a charged particle that results when an atom gains or loses one or more electrons


## Chemicals and Their Properties

A. the elements (except hydrogen) in the first column of the periodic table (Group 1)
:. the elements in the second column of the periodic table (Group 2)
A. a negatively charged ion
H. a model representing the arrangement of electrons in orbits around the nucleus of an atom
H. a positively charged ion
H. a description of what a substance does as it changes into one or more new substances
H. a pure substance composed of one or more elements in a fixed ratio
H. a bond that results from the sharing of outer electrons between non-metal atoms
I. a molecule consisting of only two atoms of either the same or different elements
E. a compound that separates into ions when it dissolves in water, producing a solution that conducts electricity
H. a pure substance that cannot be broken down into simpler substances
H. a column of elements in the periodic table with similar properties

An the elements in the seventeenth column of the periodic table (Group 17)
H. a charged particle that results when an atom gains or loses one or more electrons
E. the simultaneous strong attraction of positive and negative ions in an ionic compound
H. a compound made up of one or more positive metal ions (cations) and one or more negative non-metal ions (anions)
:. a pure substance formed from two or more non-metals
H. a particle in which atoms are joined by covalent bonds

In the elements in the eighteenth column of the periodic table (Group 18)
H. a row of elements in the periodic table
H. a description of a substance that does not involve forming a new substance; for example, colour, texture, density, smell, solubility, taste, melting point, and physical state
H. an ion made up of more than one atom that acts as a single particle

Y Y C M N E S I O N T P E R I O D P W G O TX HMDNOBCINO I YENZWH I R F B Y T R E P O R P L A C I S Y H P I E W I H A L O G E N S G K E F I D G N S P M K H P P O L Y A T OM I C I O N L L O A C D N O B T N E L A VOCY PO H A R R W C OM P O U N D M O Y G A S G I T P G I P I V H Z C U L Y V A A D D I L E L A X A G W P M O L E C U L E I N N E M A I ATLONGDSRBNUOACX HCDZDMK E A B ATFOWITOO I T I D D U V F A LGX U Z I GVOPVF R M R B N X E R L I F U M N I I M M K E A E O C R U O I R I M B V A Y I I O S L E H F Z D X O T N E M E L E H I C C E E E C R S H D E P N F X E U Y D N M R S C NGEVAVMOMLEFTPKOOAAT I I H K L E I C L O Y B U A I A L L G R L K T Y Z T E V A X C Z U D L K E U E O A $X$ U A A S OLLI FCZCMSCCLL K M R C N Y L X F P H U I G E O U E B Y L K R G C O P S W O D Y R N K H L L O T A I H Y E S I Y P F L O M U O G E O N E E OOO I C E I M H UV I OL I YMTX T F B L W P H F I P M E T U O E Z G O V

## 

## Chemicals and Their Reactions

H. a way of describing a chemical reaction using the chemical formulas of the reactants and products
H. a process in which substances interact, causing the formation of new substances with new properties
H. the rapid reaction of a substance with oxygen to produce oxides and energy; burning
H. a combustion reaction of hydrocarbons that uses all the available fuel and produces only carbon dioxide, water, and energy; occurs when the supply of oxygen is plentiful
A. the breakdown of a metal resulting from reactions with chemicals in its environment
H. a reaction in which a large or more complex molecule breaks down to form two (or more) simpler products; general pattern: $A B \rightarrow A+B$
E. a reaction that occurs when elements in different compounds displace each other or exchange places, producing two new compounds; general pattern $A B+C D \rightarrow A D+C B$
. . steel that has been coated with a protective layer of zinc, which forms a hard, insoluble oxide
E. a combustion reaction of hydrocarbons that may produce carbon monoxide, carbon, carbon dioxide, soot, water, and energy; occurs when the oxygen supply is limited
I. the statement that, in any given chemical reaction, the total mass of the reactants equals the total mass of the products
A. a solid formed from the reaction of two solutions
H. a chemical that is produced during a chemical reaction
H. a chemical, present at the start of a chemical reaction, that is used up during the reaction

In a reaction in which an element displaces another element in a compound, producing a new compound and a new element; general pattern: $A+B C \rightarrow A C+B$
E. a symbol indicating the physical state of the chemical at room temperature
H. a reaction in which two reactants combine to make a larger or more complex product; general pattern: $A+B \rightarrow A B$
H. a way of describing a chemical reaction using the names of the reactants and products

NHCTCUGAWUYWJAUNO ISORROCQ Z D W T D K N V C K W D U D J R S P T T NMU J U H M O A J U O G R G Y Z L F GN I Y I S O J R G V Z A R S B Z I P P F EMYUDXNAZB I YGIW X A D H S X T G ONULWTULGVNJTCRBE T P E A S B A Y D C K H S P D A L S O I C G Y S K B H Q T A L U T Z O A D R L QMEV I FATVLQ K T U I M GQGWMNRHZWADVTCEPNUM L D A U F D E L Y B I X L M R W I WC W R A I T N E C T Q O W L E I UNON I QC S L A L N G GEV E B I PN Q A I B S X Y PMMH P Y E C O Z T X H T O O W O L C N T T Y P T V A E L M R O I GEHO S L N A I S I C R I S V C P U M A H T M T E O N W D O S S T PM OMOBTVFR I C T N P I F M F A E B Q Y A R E M H N F K J A F C E C E L S N S L H ZMSNVEHPHDLPUMWAMUMEODNRN I Y Q T R C C L C O O O Q E O L E Q E T P D GNO NSHHE I BEUICKQPBRNGCEMMZBS A E Q E S P N T T C U D O R P E T O A C O O Y P K V T M S N I C E A Z M X T J I A R L L O C X J Q T LAP I OTCCGVOVF JAC E WPMEXNTN A T N S C A P O X P T L Q E A T A N S B D V E D A G S X R F T EMNVAONP I I C D I U U R Y Q T D QLEOEOBLXDCFGJOTXDSDLZYC B T U A W Z P U D Z L R F Q A N I T E T OLUSA Y N S C A V I S H J FMD K S Z O J L I V G C S E F G Y T L Q M T P Z H X N Y CHN I B O K Y S D R F E C I P O Y I X T Z A H A P F T L U N C E I S C U J D O B Z V OH K Q O Q R B J U G O J I R U Y X V E I N S P END C S X D Q P I I A D O WM Q D Y


## Acids and Bases

E. an aqueous solution that conducts electricity, tastes sour, turns blue litmus red, and neutralizes bases
E. the process of removing heavy metals from contaminated soils by adding an acid solution to the soil and catching the solution that drains through
E. any precipitation with a pH of less than the normal pH of rain, which is approximately 5.6

En a substance that changes colour depending on whether it is in an acid or a base
H. an aqueous solution that conducts electricity and turns red litmus blue
H. the ability of a substance to resist changes in pH

En the process in which acid-forming pollutants fall directly to Earth in the dry state
E. neither acidic nor basic; with a pH of 7
H. a chemical reaction in which an acid and a base react to form an ionic compound (a salt) and water; the resulting pH is closer to 7
H. a measure of how acidic or basic a solution is
H. a numerical scale ranging from 0 to 14 that is used to compare the acidity of solutions

C I C Z X A T K D H I I MMOSGFNY $N Z J V K W G M P C T X S R T U S K X B$ E S C D L Q X Q P JW E A C P T A LMO UCVAVLPPTHXWSDPPABBK T D E H G N I H C A E L D I C A A I D Z R P Z F K K G P E X N O L C W F U H N T A T GXK H A J E V P P GA P N A L E D L J V Q K G C P O D H B K Y H O C Z D Z I E K J N O I S O K K A V W N F I I N L $Z L C N A X D L J Q V A Q E B M D I O G$ A S Y Y I K B D J D P P U U N R P R B I T D W C S W A G S Y W T T K B S R Q Z L I S M H J N S W L V R N E T W Q E G S Q OMCOE Y E I F A C E O UN P C GX K $N$ Y O S U Q I A L O A B F R R E I I C Q $R \quad J A B Z B N Q U F R U A T R E P P Q H$ E B F N S N D B A J R A C Y A L I J C R A W M N A Z I A X H I P L O F A T B X Q C C D R E A CR S Y J F E Q O C A G F A T J M C F O A B X H E D L M X S THKM I K V K N O T D D C H N U V G H I Q K E O P E G I S O T J X A P W T J P OME Z N O P K E JRUI J Q Q Q P J R N O E O V H V B U F F E R I N G C A P A C I T Y N F S W N O I T I S O P E D Y R D O K O

## Chemical Properties \& Reactions

E. an aqueous solution that conducts electricity, tastes sour, turns blue litmus red, and neutralizes bases
... the process of removing heavy metals from contaminated soils by adding an acid solution to the soil and catching the solution that drains through
E. any precipitation with a pH of less than the normal pH of rain, which is approximately 5.6
E. a substance that changes colour depending on whether it is in an acid or a base
.. the elements (except hydrogen) in the first column of the periodic table (Group 1)
E. the elements in the second column of the periodic table (Group 2)
I. a negatively charged ion
E. an aqueous solution that conducts electricity and turns red litmus blue
.. a model representing the arrangement of electrons in orbits around the nucleus of an atom
E. the ability of a substance to resist changes in pH
.. a positively charged ion
.. a way of describing a chemical reaction using the chemical formulas of the reactants and products
... a description of what a substance does as it changes into one or more new substances
E. a process in which substances interact, causing the formation of new substances with new properties
E. the rapid reaction of a substance with oxygen to produce oxides and energy; burning
H. a combustion reaction of hydrocarbons that uses all the available fuel and produces only carbon dioxide, water, and energy; occurs when the supply of oxygen is plentiful
E. a pure substance composed of one or more elements in a fixed ratio
E. the breakdown of a metal resulting from reactions with chemicals in its environment
... a bond that results from the sharing of outer electrons between non-metal atoms
.. a reaction in which a large or more complex molecule breaks down to form two (or more) simpler products; general pattern: $A B \rightarrow A+B$
E. a molecule consisting of only two atoms of either the same or different elements
I. a reaction that occurs when elements in different compounds displace each other or exchange places, producing two new compounds; general pattern $A B+C D \rightarrow A D+C B$
E. the process in which acid-forming pollutants fall directly to Earth in the dry state
E. a compound that separates into ions when it dissolves in water, producing a solution that conducts electricity
H. a pure substance that cannot be broken down into simpler substances
.. steel that has been coated with a protective layer of zinc, which forms a hard, insoluble oxide
... a column of elements in the periodic table with similar properties
\#. the elements in the seventeenth column of the periodic table (Group 17)
I. a combustion reaction of hydrocarbons that may produce carbon monoxide, carbon, carbon dioxide, soot, water, and energy; occurs when the oxygen supply is limited
I. a charged particle that results when an atom gains or loses one or more electrons
E. the simultaneous strong attraction of positive and negative ions in an ionic compound
E. a compound made up of one or more positive metal ions (cations) and one or more negative non-metal ions (anions)
F. a pure substance formed from two or more non-metals
E. a particle in which atoms are joined by covalent bonds
... neither acidic nor basic; with a pH of 7
... a chemical reaction in which an acid and a base react to form an ionic compound (a salt) and water; the resulting pH is closer to 7
.. the elements in the eighteenth column of the periodic table (Group 18)
I. a row of elements in the periodic table
E. a measure of how acidic or basic a solution is
H. a numerical scale ranging from 0 to 14 that is used to compare the acidity of solutions
H. a description of a substance that does not involve forming a new substance; for example, colour, texture, density, smell, solubility, taste, melting point, and physical state
I. an ion made up of more than one atom that acts as a single particle
E. a solid formed from the reaction of two solutions
H. a chemical that is produced during a chemical reaction
.. a chemical, present at the start of a chemical reaction, that is used up during the reaction
I. a symbol indicating the physical state of the chemical at room temperature
I. a reaction in which two reactants combine to make a larger or more complex product; general pattern: $A+B \rightarrow A B$
.. a way of describing a chemical reaction using the names of the reactants and products

H R Y P C OR R O S I O N E L U C E L OMC I M OTA I D R I F P O C N O I T S U B M O C L A V V L F B K Z E I I T E Y X T K A G D N U O P M O C C I N O I G R O U P W V F W P G H I NCOM P L E T E C OM B U S T I ONL I Y X I P O O F E I B L P E I X A W D N P H Y S I C A L P R O P ER T Y D H T WGO I S E C GFO I R OTAC I DN I E S A B D I CANA H D H I O O S W H G Y C Y T R E P O R P L A C I M E H C E T N S G Z W V T L E H W P A E Z R N N O Z D T G N W Z D D U I E L U C E L OM O T I T S X K G O U V W E K C E P T G O T P L I H E B A K Z B I B E W B A A I F T D C D A N Y O I U R I L I NKHUR ONYRC F B L L C A A F O S T OV H B B A C Y I A C I D L E A C H I NGKV I C S OM I I B C A F L L E B T I K S Z F I X I M S W B A A M I T E P S O L O L O E T R H O I N Z A X S F D U U T O L N O D A O O Y N E V O P D N P L U H C O Z F H M OV S L A I I T P T X S N S G A G R I E N X A D R A I E L P I D L Z I M Z A R E E I T L A L E O S M O L H N D R P T L P R F G V X E E Y E S T T H A S E N D P E I K D U Y E U A I W E O O I Z T D L C Y Y I E T E N S U L L T P I O I F M T C S P I G Z Z A S O I M L O S E S T E C A E S H H P O N O W H G OX H Y C L T P P B O N I M X B Z T C R U X L M N O L L E E N P E U A S E D I O R R S H F O F X E E B O D O I I E OM G R I E X H R E R T L T E R T X N I G M A M V O C C T C O I Z X F R D H H L I A R C A E R U D N K E C O Z A W B C U Y C T X V O E Y K S U T W E C A A E S A B N T C H C O O A L W A M H E B R F R T Y I D L T C E T I Z A T A E I Z R N E A K L K A T L C D F D O O O E I T E OMVKRNT M S D D R R T E B S C X A O D U K N M D O I N R B I I E T E C C E A L C L O C G N S T C A I B B K T N O I W G G G A V L L U O A A O E U C C C G K T S W A P Z B L N L F Y W B C X P W N U P C M I A G R L E D B W H W G I R N I A H E T I T L M S D A Y I P X T P K B A N N K G P I R B Y B K I A I O I W O E X T N M O P I B P G N T E O Z L U N A G N L I Y O C O L C NE I X E U H O H YCR I F G I NV B UM W A H G U E N K X L L O L H N P N N O I T C A E R N O I T A Z I L A R T U E N B W N I C D L Y M R C G L G Y NV A H W E N C D C O I A D Y

## Earth's Climate System

## Across

4 a natural process whereby gases and clouds absorb infrared radiation emitted from Earth's surface and radiate it, heating the atmosphere and Earth's surface (2 words)

6 a time in Earth's history when Earth is colder and much of the planet is covered in ice (2 words)

7 the layer of gases surrounding Earth

14 a time between ice ages when Earth warms up (2 words)

Down
1 the energy present in the motion of particles at a particular temperature (2 words)

2 any gas in the atmosphere (such as water vapour, carbon dioxide, and methane) that absorbs lower-energy infrared radiation (2 words)

3 the continuous flow of water around the world's oceans driven by differences in water temperatures and salinity (2 words)

5 the complex set of components that interact with each other to produce Earth's climate (2 words)
8 the theory that Earth's continents used to be one supercontinent named Pangaea (2 words)

9 a form of invisible lowerenergy radiation (2 words)
10 a circular current in air and other fluids caused by the rising of warm fluid as cold fluid sinks (2 words)

11 the theory explaining the slow movement of the large plates of Earth's crust (2 words)
12 a process in which the result acts to influence the original process (2 words)

13 the average of the weather in a region over a long period of time


## Responding to Climate Change

## Across

3 the increase in the volume of matter as its temperature increases (2 words)
6 reducing unwanted change by deliberate decisions and actions

7 a source of energy that produces no significant greenhouse gases (3 words)

Down
1 effects on human society and our natural environment that are caused by changes in climate, such as rises in
Earth's global
temperature (4 words)
2 resulting from a human influence
4 a scientific forecast of future climate based on observation and computer models (2 words)
5 a plan within the United Nations for controlling greenhouse gas emissions (2 words)


## Earth's Changing Climate

## Across

2 a scientific forecast of future climate based on observation and computer models (2 words)

4 a graphical representation of current and future climate data from a specific location (2 words)

5 the part of the climate system that includes all water on and around Earth

7 the increase in the volume of matter as its temperature increases (2 words)
8 the theory explaining the slow movement of the large plates of Earth's crust (2 words)

9 a form of invisible lower-energy radiation (2 words)

10 the energy present in the motion of particles at a particular temperature (2 words)

11 a measure of how much of the Sun's radiation is reflected by a surface

12 the theory that Earth's continents used to be one supercontinent named Pangaea (2 words)

13 a circular current in air and other fluids caused by the rising of warm fluid as cold fluid sinks (2 words)

14 resulting from a human influence

16 the continuous flow of water around the world's oceans driven by differences in water temperatures and salinity (2 words)

17 a natural process whereby gases and clouds absorb infrared radiation emitted from Earth's surface and radiate it, heating the atmosphere and Earth's surface (2 words)
18 a time between ice ages when Earth warms up (2 words)

## Down

1 the average of the weather in a region over a long period of time
3 the increase in the amount of lower-energy infrared radiation trapped by the atmosphere as a result of higher levels of greenhouse gases in the atmosphere due to human activities, which is leading to an increase in Earth's average global temperature (3 words)

6 a form of invisible higher-energy radiation (2 words)
15 a time in Earth's history when Earth is colder and much of the planet is covered in ice (2 words)


## Earth's Changing Climate

## Across

1 a scientific forecast of future climate based on observation and computer models (2 words)
4 a natural process whereby gases and clouds absorb infrared radiation emitted from Earth's surface and radiate it, heating the atmosphere and Earth's surface (2 words)
5 the theory explaining the slow movement of the large plates of Earth's crust (2 words)
10 reducing unwanted change by deliberate decisions and actions

18 the continuous flow of water around the world's oceans driven by differences in water temperatures and salinity (2 words)

19 atmospheric conditions, including temperature, precipitation, wind, and humidity, in a particular location over a short period of time, such as a day or a week

20 a time in Earth's history when Earth is colder and much of the planet is covered in ice (2 words)

## Down

2 the increase in the amount of lowerenergy infrared radiation trapped by the atmosphere as a result of higher levels of greenhouse gases in the atmosphere due to human activities, which is leading to an increase in Earth's average global temperature (3 words)

3 a reservoir, such as the ocean, that absorbs and stores thermal energy (2 words)

6 resulting from a human influence
7 the average of the weather in a region over a long period of time
8 a form of invisible higher-energy radiation (2 words)
9 a graphical representation of current and future climate data from a specific location (2 words)

11 a time between ice ages when Earth warms up (2 words)
12 a form of invisible lower-energy radiation (2 words)
13 a circular current in air and other fluids caused by the rising of warm fluid as cold fluid sinks (2 words)
14 the positive feedback loop in which an increase in Earth's temperature causes ice to melt, so more radiation in absorbed by Earth's surface, leading to further increases in temperature (2 words)
15 the complex set of components that interact with each other to produce Earth's climate (2 words)
16 the theory that Earth's continents used to be one supercontinent named Pangaea (2 words)
17 the part of the climate system that includes all water on and around Earth


## Earth's Climate System

- a measure of how much of the Sun's radiation is reflected by a surface
H. the positive feedback loop in which an increase in Earth's temperature causes ice to melt, so more radiation in absorbed by Earth's surface, leading to further increases in temperature
:- the layer of gases surrounding Earth
E- a graphical representation of current and future climate data from a specific location
H. a reservoir, such as an ocean or a forest, that absorbs carbon dioxide from the atmosphere and stores the carbon in another form
... the average of the weather in a region over a long period of time
H. the complex set of components that interact with each other to produce Earth's climate
:- the theory that Earth's continents used to be one supercontinent named Pangaea
: . a circular current in air and other fluids caused by the rising of warm fluid as cold fluid sinks

En a process in which the result acts to influence the original process
: clouds absorb infrared radiation emitted from Earth's surface and radiate it, heating the atmosphere and Earth's surface
H. any gas in the atmosphere (such as water vapour, carbon dioxide, and methane) that absorbs lower-energy infrared radiation
H. a reservoir, such as the ocean, that absorbs and stores thermal energy
H. the part of the climate system that includes all water on and around Earth
:- a time in Earth's history when Earth is colder and much of the planet is covered in ice
H. a form of invisible lower-energy radiation

In a time between ice ages when Earth warms up
. . the part of the climate system made up of the solid rock, soil, and minerals of Earth's crust
H. the theory explaining the slow movement of the large plates of Earth's crust
H. stores of information in tree rings, ice cores, and fossils that can be measured to give clues to what the climate was like in the past
H. the energy present in the motion of particles at a particular temperature
E. $=$ atmospheric conditions, including temperature, precipitation, wind, and humidity, in a particular location over a short period of time, such as a day or a week

X E R E H P S O R D Y H Z B Z C H S Y H S THERMALENER GYLGFLZ J W Y D H Y J C C F L V Q A I PREI X B B T O W G R E H T A E WMM A E E N G I Z F I W T B I BCRD A P L F E D F R O Q I R O V K Q B D D TVBZJNBREC OREUPXZN I E FEKGQHAAEL H D P M L B Q L I X D R Q B E O C R N I C L L E A I K E C O U T M Z E U K E H M O A A T T O G X E Q X K A J R S L D O A N T I S E S J F A C O J R X E E O R U T V N C Y T L F S G C B L D L H E O A S E E E A S E E E F E U Z Y R Z P F P D E P C N L E C B H N M Y Z B O X S F H I G R T I G T T C T B J H M R C Z O E R A A O I T R A O C K N I S T A E H M C T T S F O N E M N W A H A N K X R M T T W I O I N O T I I W V R C U A A Y R A F P O S L C C N L C Q U G B E D P X X A B U N R E U C I C S D B E S O A U O I T X Z A B Y R D F X F A C HEMN J R F V FWD P A $R W J U A L B E D O B S P R E T O R T N$ E M Z P K W P X T F E X I N D D H J W S N E R E H P S O H T I L H N U D D A I S TGNAZFXMESCNIVKDAPZC

## Responding to Climate Change

:- resulting from a human influence
. . the increase in the amount of lowerenergy infrared radiation trapped by the atmosphere as a result of higher levels of greenhouse gases in the atmosphere due to human activities, which is leading to an increase in Earth's average global temperature
H. a source of energy that produces no significant greenhouse gases
H. a scientific forecast of future climate based on observation and computer models
… effects on human society and our natural environment that are caused by changes in climate, such as rises in Earth's global temperature
I. a plan within the United Nations for controlling greenhouse gas emissions
E. reducing unwanted change by deliberate decisions and actions
:- the increase in the volume of matter as its temperature increases

V A H LM H D A J I G C J U G J Q X V WMM Q E E PHCNPKRAXYRECQXINWSLMQKGY M U P V Y L Y N O A D A Q E E Y J I EN I R E OH E I R B V F S T B C L C B C G P B UNATBIM F K W Y T O E J H P HC R W R N RVT J I V Z N L P Y A C U A U T R OM Y GHUATBX F T D L Q F R O W V B U M E O K D A S U O H E T U B J P D R Q Z T F A B T W E P H L R C T S C E C L B B I I K G I OMMZCVCOCZLRHYEEIALNKWNWG P R L W O B W G L B S D E G T Y N Q U L Q D X F C RVXYAKAE I AVHRRANETSWVXHMM O D Z R Q K O NMVUBMEM I G P Y F D K R P N T S K V K L S I A V F X A N I E O Y C P S Y J H O O H U T K B C C T W W I L E L P P U C K R M R C I C A F X P GHGECHZENC GOGHHHMZRT O Q U J O Z Q R P X I I X A F V R O I S Y P X M A L Z T R F D F E R X C R P E O A H R S R V Q E X G W E W O F U P E OA O D A L S N T F X B L K T J I R L Y UMC I N J T O S N C T N N P U O V K F F T C L M S M P I H E L U Z S G C X A V Z P F E G D I X A T V J X Y O C P E P I E A K C T N J A P J A M T WM E N L P U T OH H O I P I I A I P E A V M O O H K Y C W Q S I W B I N E M S F G H O Z I B H J L S M E Y Y Z E O W O S W L I L D Q E Y E E E A G P R S H A S H EN J T F A N P B Z Y X U D F K F B Y V G F Q S K F R U S R S D T Y H B S X K I UMM X J H E Z W V F J N O B T H T H G P C P J C U S K N A P D F U Z E D A X I S C S J K A F Y B L N T M H Z Q L R Z A C I M K E RMAREGUZEHII U WM O B O P G T A M V F RM B C O J L U C W H T R

## Earth's Changing Climate

. . a measure of how much of the Sun's radiation is reflected by a surface
E. the positive feedback loop in which an increase in Earth's temperature causes ice to melt, so more radiation in absorbed by Earth's surface, leading to further increases in temperature
E. resulting from a human influence
E. the increase in the amount of lower-energy infrared radiation trapped by the atmosphere as a result of higher levels of greenhouse gases in the atmosphere due to human activities, which is leading to an increase in Earth's average global temperature
.
I. a graphical representation of current and future climate data from a specific location
... a reservoir, such as an ocean or a forest, that absorbs carbon dioxide from the atmosphere and stores the carbon in another form
. greenhouse gases
E. the average of the weather in a region over a long period of time
… a scientific forecast of future climate based on observation and computer models
E. the complex set of components that interact with each other to produce Earth's climate
E. the theory that Earth's continents used to be one supercontinent named Pangaea
. . a circular current in air and other fluids caused by the rising of warm fluid as cold fluid sinks
․․ a process in which the result acts to influence the original process
-. a natural process whereby gases and clouds absorb infrared radiation emitted from Earth's surface and radiate it, heating the atmosphere and Earth's surface
". . any gas in the atmosphere (such as water vapour, carbon dioxide, and methane) that absorbs lowerenergy infrared radiation

- a reservoir, such as the ocean, that absorbs and stores thermal energy
:. the part of the climate system that includes all water on and around Earth
I. a time in Earth's history when Earth is colder and much of the planet is covered in ice
.. effects on human society and our natural environment that are caused by changes in climate, such as rises in Earth's global temperature
... a form of invisible lower-energy radiation
E. a time between ice ages when Earth warms up
. In a plan within the United Nations for controlling greenhouse gas emissions
. . . the part of the climate system made up of the solid rock, soil, and minerals of Earth's crust
. . reducing unwanted change by deliberate decisions and actions
. . the theory explaining the slow movement of the large plates of Earth's crust
fossils that can be measured to give clues to what the climate was like in the past
-     - the energy present in the motion of particles at a particular temperature
". . the increase in the volume of matter as its temperature increases
. . . a form of invisible higher-energy radiation
. . atmospheric conditions, including temperature, precipitation, wind, and humidity, in a particular location over a short period of time, such as a day or a week

J J T T B J R T N O A A H P I M R K U A I Y T N Y S J B G N D N N F E WVNXOYE I N T ER GLAC I A L P ER I O D O B G I D U T E U O I B R M G C J B M Q L P D R Y H R C I R J Y R R T M C R B R C S Q E D P E B Y T N T K E L U B O E U A V E D H M E R N Z Q S N C H D M S K Z X V D J W E U Y R P B R E L A U F U N A X TM A O P O EM H D X C B Q E L N K T N I N A D Y F C S W H G Z E P F S H T B T L R E Z I U E Q W R E H T L E E N E H B D F N G X M O Z S E H O V T B T U V J Z D O N J G E O J K Z F D U P R E V M A Y S C H X U N T H U CRUENNS I S C E W B T R GELNTZSOBTMYTN F T R S N O A U T P C Y U R O D P I E A G A S E Y F W K D L W J X E I I H O C T V A T P Q F O N B N M P U O T F E N L T E S Z G T T C H E B J K D Z R G E S W E H R P E L A P M N Z Z TYANAENVWACNVWRYJCEBOEAQNMXQSP S QS O I T E N JED R I G G LVRA I A U H OXN I GMR I THCDAEOVGGVYSZGEHWOC GSTTGILZE Y I T W A M R C F X N S T N T J L B R C K A E E C I G Q C H C A PVR I GVH Q OH H ZMA UM J L A Y R R E L WMR T C N P L D L C M D U S O B L C VEHN I MVE B O F W A K A L T J O E C I PRVI R Z W U Y X H N M F Y F H O Z F P V E I H U C R F N C I K Z C O F P G P P F A C Z U S D N B E E W M R B O A O E O Z D W E E K M R VM U TV QM J M U S A C M A O F T R S G N C R L R K A E E N P T E OR U X X H T I I T T P S O F T OK G O B J T K G N N O S P K U I H B F P T N O E OHRNCPVCCAJJJKEMOARXZFNGPGJEK P G V P I A O W I E E T A M I L C L Y O A W J O L C F J B N R E A O H P R I N R O V V I I A P K F F G O A I H Q F S R T O N O T B M H W N Y Q T O H L M Z C Q I G E L T K H F Y W J J I Y O X I T S H X X M L I O R K A T L W L I A P X F Y K P E C C Y H C N J A O GC E J O E U B E EMVOG JPEQ I G C V F K R N A F Y R S H Y V H H T D V R Z D T I P X J E T S T M W F H T M W B P C F C S H T D E V F E Q X T P P R A W M I X W C D X H Y D R O S P H EREEA BEWK I V GM I X X OS C I N O T C E T E T A L P L Y F L H N D ZMMC P I I K N L K X B U L T R A V I O L E T R A D I A T I ON B Q S A R

## Production and Reflection of Light

## Across

4 the point where the principal axis meets the mirror
5 the ray that bounces off a reflective surface (2 words)
7 produces its own light
8 to meet at a common point
14 any polished surface reflecting an image
15 reproduction of an object through the use of light
16 the centre of the sphere whose surface has been used to make the mirror (3 words)
17 the angle between the reflected ray and the normal (3 words)

## Down

1 to spread apart
2 the classification of electromagnetic waves by energy (2 words)
3 when a material transmits some incident light but absorbs or reflects the rest; objects are not clearly seen through the material

6 the angle between the incident ray and the normal (3 words)

9 at right angles
10 light emitted from a source that strikes an object (2 words)

11 a mirror shaped like part of the surface of a sphere in which the inner surface is reflective (2 words)
12 an image formed by light coming from an apparent light source; light is not arriving at or coming from the actual image location (2 words)
13 when a material transmits all or almost all incident light; objects can be clearly seen through the material


## The Refraction of Light

## Across

7 the angle between the refracted ray and the normal (3 words)
9 the separation of white light into its constituent colours

## Down

1 the ratio of the speed of light in a vacuum to the speed of light in a medium (3 words)
2 the bending or change in direction of light when it travels from one medium into another

3 the situation when the angle of incidence is greater than the critical angle (3 words)

4 the angle of incidence that results in an angle of refraction of $90^{\circ}$ (2 words)

5 the depth at which an object appears to be at, due to the refraction of light in a transparent medium (2 words)

6 an optical device in which the emergent ray is parallel to the incident ray

8 a virtual image that forms as a result of refraction and total internal reflection in Earth's atmosphere


## Lenses and Optical Devices

## Across

2 the point on the principal axis of a lens where light rays parallel to the principal axis converge after refraction (2 words)
3 point at the exact centre of the lens (2 words)
4 a lens that is placed directly on the cornea of the eye ( 2 words)
5 a lens that is thinnest in the middle and that causes incident parallel light rays to spread apart after refraction (2 words)
6 the light ray that leaves a lens after refraction
(2 words)
8 a lens that is thickest in the middle and that causes incident parallel light rays to converge through a single point after refraction (2 words)

9 the inability of the eye to focus light from distant objects; nearsightedness
10 the inability of the eye to focus light from near objects; far-sightedness

## Down

1 the mathematical relationship between object distance, image distance, and focal length for thin lenses (3 words)
7 a form of far-sightedness caused by loss of accommodation as a person ages


## Light and Geometric Optics

## Across

2 the mathematical relationship between object distance, image distance, and focal length for thin lenses (3 words)
3 the angle of incidence that results in an angle of refraction of $90^{\circ}$ (2 words)
4 the point on the principal axis of a lens where light rays parallel to the principal axis converge after refraction (2 words)
5 a mirror shaped like part of the surface of a sphere in which the inner surface is reflective (2 words)
10 when a material does not transmit any incident light; all incident light is either absorbed or reflected; objects behind the material cannot be seen at all

14 the situation when the angle of incidence is greater than the critical angle (3 words)

16 reproduction of an object through the use of light

17 produces its own light
19 flat
20 a virtual image that forms as a result of refraction and total internal reflection in Earth's atmosphere
21 a mirror shaped like part of the surface of a sphere in which the outer surface is reflective (2 words)

Down
1 the ratio of the speed of light in a vacuum to the speed of light in a medium (3 words)

6 the continuous sequence of colours that make up white light (2 words)
7 a wave that has both electric and magnetic parts, does not require a medium, and travels at the speed of light (2 words)
8 a lens that is thickest in the middle and that causes incident parallel light rays to converge through a single point after refraction (2 words)
9 the centre of the sphere whose surface has been used to make the mirror (3 words)
11 the angle between the incident ray and the normal (3 words)

12 the angle between the refracted ray and the normal (3 words)
13 the angle between the reflected ray and the normal (3 words)

15 point at the exact centre of the lens (2 words)
18 the inability of the eye to focus light from distant objects; nearsightedness


## Light and Geometric Optics

Across
3 the point on the principal axis of a lens where light rays parallel to the principal axis converge after refraction (2 words)

5 an optical device in which the emergent ray is parallel to the incident ray
6 the ratio of the speed of light in a vacuum to the speed of light in a medium (3 words)
7 at right angles
9 the angle between the reflected ray and the normal (3 words)

14 the situation when the angle of incidence is greater than the critical angle (3 words)
16 the inability of the eye to focus light from near objects; farsightedness
17 electromagnetic waves that the human eye can detect ( 2 words)
18 a mirror shaped like part of the surface of a sphere in which the inner surface is reflective (2 words)
19 the continuous sequence of colours that make up white light (2 words)

20 a lens that is thickest in the middle and that causes incident parallel light rays to converge through a single point after refraction (2 words)

## Down

1 reproduction of an object through the use of light
2 a wave that has both electric and magnetic parts, does not require a medium, and travels at the speed of light (2 words)
4 flat
8 the angle between the refracted ray and the normal (3 words)
10 when a material transmits some incident light but absorbs or reflects the rest; objects are not clearly seen through the material
11 the mathematical relationship between object distance, image distance, and focal length for thin lenses (3 words)
12 a lens that is placed directly on the cornea of the eye (2 words)
13 the angle between the incident ray and the normal (3 words)
15 the line through the centre of curvature to the midpoint of a mirror (2 words)


## Production and Reflection of Light

H. the angle between the incident ray and the normal
E. the angle between the reflected ray and the normal
n. the centre of the sphere whose surface has been used to make the mirror
E. a mirror shaped like part of the surface of a sphere in which the inner surface is reflective
H. to meet at a common point
H. a mirror shaped like part of the surface of a sphere in which the outer surface is reflective
H. to spread apart
H. the classification of electromagnetic waves by energy
H. a wave that has both electric and magnetic parts, does not require a medium, and travels at the speed of light
H. the point at which light rays parallel to the principal axis converge when they are reflected off a concave mirror
E. reproduction of an object through the use of light
H. light emitted from a source that strikes an object
H. an incoming ray that strikes a surface
H. a line on a diagram representing the direction and path that light is travelling
nı produces its own light
H. any polished surface reflecting an image
n. does not produce its own light
H. the perpendicular line to a mirror surface
E. when a material does not transmit any incident light; all incident light is either absorbed or reflected; objects behind the material cannot be seen at all

En at right angles
E. flat
E. the line through the centre of curvature to the midpoint of a mirror
n. an image that can be seen on a screen as a result of light rays actually arriving at the image location
H. the ray that bounces off a reflective surface
H. the bouncing back of light from a surface
H. when a material transmits some incident light but absorbs or reflects the rest; objects are not clearly seen through the material
. . when a material transmits all or almost all incident light; objects can be clearly seen through the material
E. the point where the principal axis meets the mirror

Ha an image formed by light coming from an apparent light source; light is not arriving at or coming from the actual image location

Z R S A V TV B F Y A R T N E D I C N I E E Y N H B X D I B E N W OMV F E I F L F Z G G U I G E G K V Z P E E S T P U E L C L C G P C A B O O D R GFI R W O C E W E G Z G M T K C V T A P I E A T L T C I O G A I R L L L E M V O O N N S K R T X F M L S O X B X I T O K O A S Y D O E W R A X K E G R E V I D K V L P X O M D T E Y L U M I N O U S I E S P A C G A R R F V O CONVERGEBRSRXI G A D L X N O N L U M I N O U S S E Y A N Y V E R U T A V R U C F O E R T N E C E V F C E M X O K G F O C U S S C T H V T Y S T I I K T H G I L T N E D I C N I I S B I PRINCIPALAXIS I VR C P Y O R A L U C I D N E P R E P D M T S A M N Z T S S UM I R R O R G R A C U $P$ U A NGLEOF I NCIDENCEUA E V A WC I T E NGAMOR T C E L E L C W H CONCAVEMIR RORNAII T T R A N S L U C E N T W U K O T A P M R H V I O CONVEXM I R R O R I M A U E L I Y A R THGILIMDS FMWG M R X A O E U O A P O F A V M L Z I B E O N O I T C E L F E R L K COTXUZ C

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## The Refraction of Light

. . the angle between the refracted ray and the normal
I. the depth at which an object appears to be at, due to the refraction of light in a transparent medium
A. the angle of incidence that results in an angle of refraction of $90^{\circ}$
H. the separation of white light into its constituent colours
H. the ratio of the speed of light in a vacuum to the speed of light in a medium
H. a virtual image that forms as a result of refraction and total internal reflection in Earth's atmosphere
F. the bending or change in direction of light when it travels from one medium into another
H. an optical device in which the emergent ray is parallel to the incident ray
H. the situation when the angle of incidence is greater than the critical angle

E W E B K S I I V Z Z S G TK Z S VG S G A Y K V U F O N F P K S V V D M O W Y A O E CGENVAFOFVRKLZOFE R B I N B G O T I M U R M E H A Z G D T I E I WR S I O L D W L I T T K S D Z E M Y G G I I T P X K P X P R T S N N I S H K C Y D T C G M F Y E I O O COCH D Y K L P O C E C C T D T N R N R I UVO Z I H Y Z V L S K T G U D E O U T O I P DUINOKFDNXIDEFIICBMG W Y U F I E E E A N O V X L S E A R G U P S F B R P R E R U B S O E R R R E H F O N L U W A L L C C P V F C E R F F X Y T R X B P L A G Z B K L R T P K E R L B N N Y P I T N NGCZ P E O S L R A K W C X A M O A R A X G G D F R I V F CM K X L N A T B E LTUNKRXD OTNW Y Z D D K Z T A P D S O A T O D E I P X EAUSLUNCCKUPCKNDLOK P N M E A X X I I X A B B T D U L G N H B X K T X W G L T F Z P L I S L U N F A W I CMNEMA I I T B Z O O S VAG I I NAXKNATRGFPXNBERWAA C L C I K F O C I K A D N P B F T G F O T Z V K B C T I F S VA Y I E S CX TG

## Lenses and Optical Devices

E. a lens that is placed directly on the cornea of the eye

Ha a lens that is thickest in the middle and that causes incident parallel light rays to converge through a single point after refraction
E. a lens that is thinnest in the middle and that causes incident parallel light rays to spread apart after refraction
H. the light ray that leaves a lens after refraction
H. the inability of the eye to focus light from near objects; farsightedness
H. the inability of the eye to focus light from distant objects; nearsightedness
H. point at the exact centre of the lens
: a form of farsightedness caused by loss of accommodation as a person ages

In the point on the principal axis of a lens where light rays parallel to the principal axis converge after refraction
E. the mathematical relationship between object distance, image distance, and focal length for thin lenses

X C B C R G M TMNUCCRCNKPOC Z P H O C O D U G C X U O K Y E T Y X O TH I N L E N S E O U A T I O N Y A T C A U K O S D Z I C I H H R M D A W R U T F I CK R Z W A U M Y D Y X O I B T V W Y R M T U A S P H P S O X V Z P O N H W K N THROCSENNXNTONEBO G F E E P G M R O H T E T G I Y I G M H O N B O O O O H U P V D T A O B U R D Y OUHEFPAISVIEPKDSGEAA P N I A I B H X W I N L B Z X E D M I F F F M A F O X E I R B N Z I K R F E A F WX T P R N D H K E D O K P M P Z B S I B D F S V X H U H E B R I E F A D D X E T I X M A H L F O S I P H O B H I M C E W M V O R I D A O Y V V W D Y W W OG I L G N COK N Y Y U M A I P O Y M H S L N L S N W F E R T N E C L A C I T P O U I V F Z V P R I NCI P A L F O C U S O X W I F N R I A L S E Z I T K H R I W N C E O T Y D U F OM R X T B B G Z C L D O N F H A I M S N E L T C A T N O C Z I K O I I B L T K A H K N Y K I N E X C N F S V A CONVERGINGLENSLD E D I VERGINGLENSNMORVD

## Light and Geometric Optics

4. the angle between the incident ray and the normal
A. the angle between the reflected ray and the normal
H. the angle between the refracted ray and the normal
H. the depth at which an object appears to be at, due to the refraction of light in a transparent medium
\#. the centre of the sphere whose surface has been used to make the mirror
I. a mirror shaped like part of the surface of a sphere in which the inner surface is reflective
E. a lens that is placed directly on the cornea of the eye
H. to meet at a common point
H. a lens that is thickest in the middle and that causes incident parallel light rays to converge through a single point after refraction
H. a mirror shaped like part of the surface of a sphere in which the outer surface is reflective
.. the angle of incidence that results in an angle of refraction of $90^{\circ}$
A. the separation of white light into its constituent colours
H. to spread apart
I. a lens that is thinnest in the middle and that causes incident parallel light rays to spread apart after refraction
A. the classification of electromagnetic waves by energy
I. a wave that has both electric and magnetic parts, does not require a medium, and travels at the speed of light
H. the light ray that leaves a lens after refraction
E. the point at which light rays parallel to the principal axis converge when they are reflected off a concave mirror
A. the inability of the eye to focus light from near objects; farsightedness
H. reproduction of an object through the use of light
H. light emitted from a source that strikes an object
H. an incoming ray that strikes a surface
H. the ratio of the speed of light in a vacuum to the speed of light in a medium
A. a line on a diagram representing the direction and path that light is travelling
H. produces its own light
H. a virtual image that forms as a result of refraction and total internal reflection in Earth's atmosphere
A. any polished surface reflecting an image
H. the inability of the eye to focus light from distant objects; near-sightedness
F. does not produce its own light
I. the perpendicular line to a mirror surface
I. when a material does not transmit any incident light; all incident light is either absorbed or reflected; objects behind the material cannot be seen at all
H. point at the exact centre of the lens
H. at right angles
H. flat
I. a form of far-sightedness caused by loss of accommodation as a person ages
A. the line through the centre of curvature to the midpoint of a mirror
H. the point on the principal axis of a lens where light rays parallel to the principal axis converge after refraction
I. an image that can be seen on a screen as a result of light rays actually arriving at the image location
H. the ray that bounces off a reflective surface
H. the bouncing back of light from a surface
A. the bending or change in direction of light when it travels from one medium into another
H. an optical device in which the emergent ray is parallel to the incident ray
.. the mathematical relationship between object distance, image distance, and focal length for thin lenses
H. when a material transmits some incident light but absorbs or reflects the rest; objects are not clearly seen through the material
H. when a material transmits all or almost all incident light; objects can be clearly seen through the material
H. the point where the principal axis meets the mirror
H. an image formed by light coming from an apparent light source; light is not arriving at or coming from the actual image location
F. electromagnetic waves that the human eye can detect

A V A I Z Z O K I K L L B B P S I X A L A P I C N I R P N T F G K H L A G R B R I E R T N E C L A C I T P O W K R N O T K H O E G P P Y A R T N E G R E M E C O V G E X E R C X I U T W E M G A K P V H O N O R M A L C E F N O S R N M L B T T B T F N H A N S A V R Y X R E T R O R E F L E C T O R B C R O O L O O Z M G I R V T H G I L E L B I S I V K P X E R A A I S A V A I I I L A E I Y A R T N E D I C N I P G Y L O R N M E NV X D T K L E H N I B G A M B U S L B W F VV E R F S A B A YV X Z C X A O U T P A M M I X M B K O I A W C R E L G H B I V X L S A I E F B D D I G C R M H C T N I M T I R U E K D H O C A G K R E R R I E O P O R A U R D O S T R M F C G I P L A N E O W G F I V E T P O O I S G O A I W C O Z O E E I C O N V E R G E X E NV F T T I R I V E O T Z F M C X N X C K E O O K R O O R Y R O U L R H S E O U F A N X A V E T E A O W R E R A E G T S A F I G E B N E P G Z U R X G T D T Y U P D Z U X G I F H L S R O T G C R OM Y H O O I N N N H T C O L X W T N A R R I D S D E C W T W V R H E R F E E I G N O D A U B G A Y I S A O K B E L E H I D X P S R A T R A I O N I P P L A OV N P T C C W W T G L K O I T N I F I A L L N V U S E O N V R R P O O T S L Z C N F U N P E M L C P A T L E L N S K G W S K U N Y B I N I N E A E L P L E U S S K N U X S R O Y L U D R V C C M T O E G O L M R N NVM P N F E M M P N X O E O X E O C F H I E N L H I F P X I A I E A H D I I K G P X O V R G P D D O K M Z E T T S E W H C N C R P I N R P I G U F G Y L V O L A E U U X G C R R R T N O T T C C OR N UV S I N V N L Y C R M R C F E A A A E S O U R C W N U O Y A Z N N S W E G R E V I D T I W T M T Y P C S U E C I S R G N G Z C D F E M X B S S I U N F D R I N X S T M W H Y S D V L C L I M N Z K K C N B L I O E G B E L O S I B I D R R I E Z W X D C P W L G P M I A X V B C H A V A C I D B M I Z N O O P X E C R I T I C A L A N G L E T B P B U R D V I V S OK N I V N B I YMEVAWC I TENGAMORTCELE G X D E A S C C I S U C O F L A P I C N I R P I M O R P K Y O C E Y G A E K N S D G I P V L G D D P R E S B Y O P I A Z V Z Z H F M D R A L U C I D N E P R E P K F T T S F C N V B

Cells and Cell Theory


Plant Systems


## Cells \& Animal \& Plant Systems



## Cells and Cell Theory



Animal Systems


## Plant Systems


Cells \& Animal \& Plant Systems


Chemicals and Their Properties Chemicals and Their Reactions Acids and Bases


Chemical Properties \& Reactions


Chemical Properties \& Reactions


## Chemicals and Their Properties



Chemicals and Their Reactions


## Acids and Bases



## Chemical Properties \& Reactions



Earth's Climate System


Responding to Climate Change


## Earth's Changing Climate



Earth's Changing Climate


## Earth's Climate System



## Responding to Climate Change



## Earth's Changing Climate



Production and Reflection of Light The Refraction of Light



Lenses and Optical Devices


Light and Geometric Optics


Light and Geometric Optics


## Production and Reflection of Light



## The Refraction of Light



## Lenses and Optical Devices

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## Light and Geometric Optics



Science is the great antidote to the poison of enthusiasm and superstition. Adam Smith

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