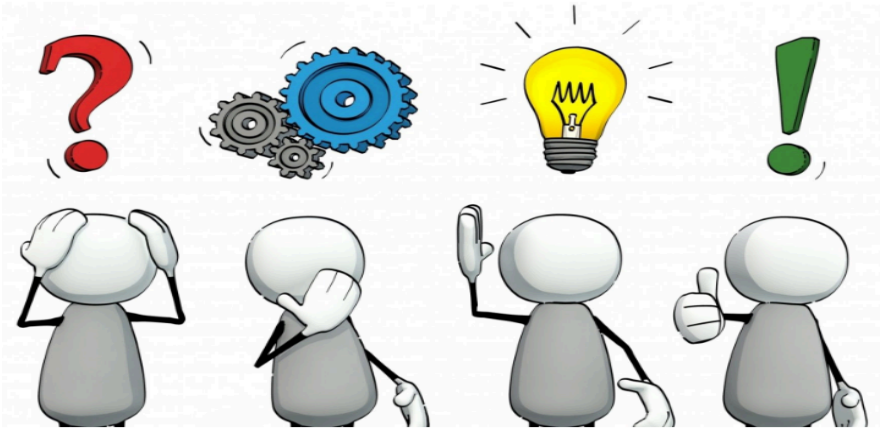
Mastering Learning

150 Challenge



150 Must-Know Facts from English, maths and science.

Name:

Form:

English Quotes and Facts

SECTION 1: Writing skills - Language Techniques

1. SOAPMAPS: descriptive language techniques acronym

	Technique	Definition	Example
1	**S**imile	A description that directly compares two things using *like* or *as*.	*The river looked like a silver ribbon.*
2	**O**nomatopoeia	Words that sound like the sound they describe.	*swish, pop, click, tap, drip*
3	**A**lliteration	Words that start with the same sound.	*The wild wolves wandered around the forbidden forest.*
4	**P**ersonification	Giving human characteristics to inanimate objects.	*The statue guarded the palace.*
5	**M**etaphor	A word or phrase used to describe something as if it was something else.	*The river was a silver ribbon.*
6	**A**djective	A word that describes a noun.	*blue, small, lonely, melancholy.*
7	**P**athetic fallacy	Giving human qualities and emotions to inanimate objects of nature.	*The merciless wind tore the town apart.*
8	**S**ensory imagery	Using words that appeal to the five senses: touch, smell, hear, sight and taste.	*The scent of fresh roses filled the room and children's laughter drifted down from the room upstairs.*

AFORESTED: **persuasive** writing techniques acronym

	Technique	Definition	Example
9	**A**necdote	Personal story (about you or someone else) which supports your point	*My sister spends all day with her eyes glued to her phone; it is going to damage her eyesight*
10	**F**act	A statement that is true.	*Burning fossil fuels releases carbon dioxide into the atmosphere.*
11	**O**pinion of an expert	Opinion of someone who has specialist knowledge/expertise in the subject.	*Dr Abuke, an environmental scientist at Cambridge University, says that households can significantly reduce their carbon footprint by making simple changes.*
12	**R**hetorical question	A question that is designed to make the listener/reader think.	*Do you want to be happy?*
13	**E**motive language	Words that are intended to make readers feel an emotion.	*The children were neglected and desperate for help.*
14	**S**tatistics	Using numbers to support a statement (usually fractions or percentages).	*95% of people agree that chocolate is delicious.*
15	**T**riple	Three adjectives, examples or clauses.	*It is good for your mind, body and soul.*
16	**E**xaggeration	Also known as hyperbole. Going over the top to strengthen your point.	*There are millions of reasons why cycling is better than travelling by car.*
17	**D**irect Address	Speaking/writing directly to the listener/reader using 'you'	*You have the power to make this change.*

SECTION 2: 'A Christmas Carol' (English Literature)

'A Christmas Carol' QUOTES

		Scrooge
18	**Scrooge is described as avaricious**	"He was a tight-fisted hand at the grindstone" (Stave 1)
19	**Scrooge is greedy and sinful**	"A squeezing, wrenching, grasping, scraping, clutching, covetous, old sinner!" (Stave 1)
20	**Scrooge is described as unfeeling and uncaring**	"Hard and sharp as flint" (Stave 1) (Flint = hard rock used to make tools)
21	**Scrooge is alone and unapproachable**	"Solitary as an oyster" (Stave 1)
22	**Scrooge does not care about the poor**	"If they had rather die, they had better do it and decrease the surplus population" (Stave 1)
23	**Scrooge questions why he should donate when institutions should support the poor**	"Are there no prisons? …and the Union workhouses?" (Stave 1)
24	**Scrooge had a lonely childhood**	"A solitary child, neglected by his friends" (Stave 2)
25	**Scrooge starts to care about others when he hears that Tiny Tim will die**	"No, no…Oh no, kind Spirit! Say he will be spared' (Stave 3)
26	**Scrooge pleads for hope from the Ghost of Christmas yet to come**	'I am not the man I was" (Stave 4)
27	**Scrooge feels like a new man when he awakes on Christmas morning**	"I am as light as a feather, I am as happy as an angel, I am as merry as a schoolboy, I am as giddy as a drunken man" (Stave 5)
28	**Scrooge is jovial and friendly towards all members of society**	"Scrooge regarded everyone with a delighted smile." (Stave 5)
29	**Scrooge donates money to the poor and recognises his past lack of charity**	"Not a farthing less. A great many back-payments are included in it I assure you' (Stave 5)
30	**Scrooge becomes a model member of the community**	"As good a friend, as good a master, and as good a man as the good old city knew" (Stave 5)
31	**Scrooge has recognised the value of family**	"To Tiny Tim, who did NOT die, he was a second father" (Stave 5)

		Ghosts
32	**Jacob Marley**	“I wear the chain I forged in life” *(*Stave 1)
33	**Ghost of Christmas Past**	“From the crown of its head there sprung a bright clear jet of light” (Stave 2)
34	**Ghost of Christmas Past**	“Your lip is trembling,” said the Ghost. “And what is that upon your cheek?” (Stave 2)
35	**Ghost of Christmas Present**	“If he die, he better do it, and decrease the surplus population” *(*Stave *3)* **Ghost of Christmas Present reminds Scrooge of his own words**
36	**Ghost of Christmas Present**	“They are man’s’ said the spirit, looking down upon them. This boy is Ignorance. This girl is want (Stave 3) ***Ghost shows Scrooge the children under his robe***
37	**Ghost of Christmas Yet to Come**	‘unwatched, unwept, uncared for, was the body of this man’ (Stave 4)
38	**Ghost of Christmas Yet to Come**	“Tell me I may sponge away the writing on this stone!” (Stave 4)
39	**Ghost of Christmas Yet to Come**	“I will honour Christmas in my heart, and try to keep it all the year” (Stave 4) *Scrooge has learnt the lessons of the ghosts*

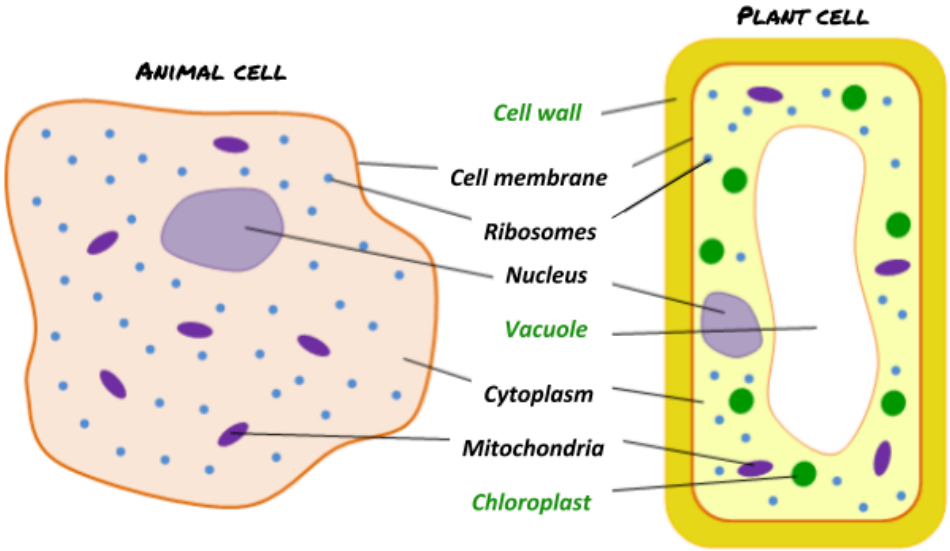
		Other characters (Fred, Belle, Fezziwig, Cratchits)
40	**Fezziwig**	“He has the power to render us happy or unhappy.” ***about Fezziwig*** (Stave 2)
41	**Belle**	“You weigh everything by gain.” “another idol has displaced me*…a golden one”* (Stave 2)
42	**Fred**	“A Merry Christmas, uncle God save you!” cried a cheerful voice (Stave 1)
43	**Little Fan**	“But first, we’re to be together all the Christmas long, and have the merriest time in all the world” (Stave 2)
44	**Tiny Tim**	“As good as gold” ***Bob uses this simile to describe his son.*** (Stave 3)
45	**Bob Cratchit**	“Mr Scrooge!” said Bob; ‘I’ll give you Mr Scrooge, The Founder of the Feast’. (Stave 3)

ACC Context: sentences to learn

46	A **cautionary tale**	First published in **1843**, Dickens' **cautionary tale** explores the terrible consequences of poverty and greed in Victorian society.
47	**The plight of the Poor**	Dickens wanted to draw attention to the **plight of the poor** by setting the novella against a **grim background of Victorian poverty.**
48	A critique of **Malthusian capitalism**	Dickens uses Scrooge's reaction to the portly gentlemen in Stave 1 to critique the Malthusian theory. Thomas Malthus warned that the population growth of the Industrial Revolution would lead only to starvation and disease as there would not be enough resources to support everyone.
49	A **political diatribe** against the punitive policies of the **1834 Poor Law**	In order to deter poor people from claiming financial help, the government passed the **Poor Law of 1834** which essentially sent the poor to live in workhouses. Dickens hated this law as it split up families and punished the poor.
50	**Secularising** Christmas	Until the mid-1800s, Christmas was solely a religious festival. Dickens helped to popularise many of the cultural elements that we now associate with Christmas (food, decorations, music). This has contributed to a **more secular** (non-religious) Christmas, based on the values of goodwill, benevolence and forgiveness.

Science Facts

SECTION 1: Biology

1-8	Be able to label an animal and plant cell:  	
9	Organelle/ subcellular	Structure within a cell.
10	Nucleus	Contains the cell's genetic information.
11	Membrane	Controls movement of substances into and out of a cell.
12	Cytoplasm	Site of most chemical reactions in the cell.
13	Mitochondria	Site of aerobic respiration.
14	Chloroplast	Site of photosynthesis and contains the pigment chlorophyll.
15	Cellulose Cell Wall	Outer layer of a plant cell which provides the cell with strength and support.
16	Vacuole	Space in the cytoplasm filled with sap. Involved in keeping the cells rigid for support.
17	Diffusion	The movement of particles from an area of high concentration to an area of low concentration.
18	Osmosis	The diffusion of water molecules from a dilute solution (high water concentration) to a concentrated solution (low water concentration) across a partially permeable membrane.

19	Active Transport	The movement of molecules from areas of low concentration to high concentration against the concentration gradient across a partially permeable membrane. This requires energy.
20	Prokaryote	Cells that do not have a true nucleus.
21	Eukaryote	Cells with a nucleus e.g. animal, plant, yeast.
22	Stem Cell	Undifferentiated cells with the potential to become any specialised cell.
23	Differentiate	When a stem changes into a more specialised cell.
24	Mitosis	A method of cell division that produces two genetically identical daughter cells.
25	Benedict's	The chemical used to test for Glucose
26	Iodine	The chemical used to test for Starch
27	Ethanol	The chemical used to test for Fats
28	Biuret's	The chemical used to test for Proteins
29	Pathogen	A microorganism that causes harm or a disease.
30	Vaccine	Medicine that carries dead or inactive versions of a pathogen.

SECTION 2: Chemistry

1	Atom	The smallest part of an element.
2	Element	Contains only one type of atom, e.g. oxygen contains only oxygen atoms
3	Compound	Two or more elements chemically bonded together.
4	Mixture	Different elements and/or compounds together but not chemically bonded. That can be physically separated.
5	Reactants	A substance we start with before a chemical reaction takes place
6	Products	A substance made as a result of a chemical reaction
7	Law of conservation of mass	The total mass of the products formed in a reaction is equal to the total mass of the reactants
8	Nucleus	Very small and dense central part of an atom that contains protons and neutrons. Where most of the mass of the atom is found.
9	Protons	A tiny positive particle found in the nucleus of an atom
10	Neutrons	A tiny neutral particle found in the nucleus of an atom

11	Electrons	A tiny negative particle found orbiting the nucleus of an atom in electron shells
12	Atomic number	Number of protons in an atom. Also called the proton number.
13	Mass number	The number of protons plus neutrons in the nucleus of an atom.
14	Periodic Table	An arrangement of elements in order of atomic number, forming groups and periods.
15	Group	Columns in the periodic table. Elements in the same column of the periodic table have similar chemical properties
16	Period	Rows in the periodic table. Elements in the same row have their outer shell electrons in the same shell
17	Symbol	The atoms of each element are represented by a chemical symbol on the Periodic Table.
18	Isotope	Atoms that have the same number of protons but different number of neutrons; e.g. $^{14}C_6$, $^{12}C_6$
19	Bond	Forces of attraction holding atoms together in a molecule.
20	Melting Point	The temperature at which a solid will melt.
21	Boiling Point	The temperature at which a substance turns from a liquid to a gas.
22	History of the atom	As new evidence was found the model for the structure of the atom changed. 1) Democritus - The 'Simple Atom' 2) Thompson - Plum Pudding model 3) Rutherford - Nuclear model 4) Bohr - Electrons on shells 5) Chadwick - Neutrons
23	Rate of reaction	How quickly a reaction takes place. This can be affected by 4 factors: surface area, temperature, concentration and a catalyst.
24	Collision Theory	Chemical reactions can only take place if the particles of the reactants collide with each other and have enough energy.
25	Activation energy	The minimum energy needed for a reaction to take place.
26	Exothermic	A reaction that transfers energy to its surroundings. It gets hotter.
27	Endothermic	A reaction that takes in energy from its surroundings. It gets colder.
28	Control Variable	A variable in an investigation that must remain constant so the results can be compared.
29	Dependent Variable	The variable which is measured in the experiment.
30	Independent Variable	The variable for which values are changed by the investigator in the experiment.

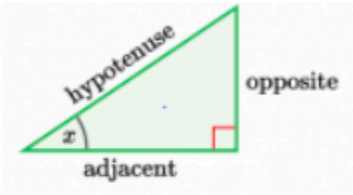
SECTION 3: Physics

	Word equation	Symbol equation
1	Kinetic energy = ½ mass x velocity^2	KE = ½ m v^2
2	Gravitational potential Energy = Mass x gravity x height	GPE = mgh
3	Work = Force x distance (in direction of force)	W = Fd
4	Power = Energy/Time	P=E / t
5	Efficiency = (useful energy output / total energy input) x 100%	*Used when energy is measured in Joules (J)*
6	Efficiency = (useful power output / total power input) x 100%	*Used when power is measured in Watts (W)*
7	Current = charge flow / time	I=Q/t
8	Voltage = Current x Resistance	V=IR
9	Power = Voltage x Current	P=VI
10	Power = Current ^{2} x Resistance	P=I^{2}R
11	Energy = power x time	E = Pt
12	Energy transferred = charge flow x potential difference	E = QV
13	Pressure = force / area	P = F / A
14	Density = mass / volume	ρ = m / v
15	Weight = mass x gravitational field strength	W=mg
16		
17	Force on spring = spring constant x extension	F=Ke
18	Average speed = distance / time	s = d /t
19	Average velocity = change in displacement / time	v = d/t
20	Acceleration = Change in velocity / time taken	a = Δv / t
21	Resultant force = mass x acceleration	F = ma
22	Unit for Mass	Kg (Kilogram)
23	Unit for Weight	Newtons/ N
24	Unit for Energy	J (Joule)

25	Unit for Force	N (newton)
26	Unit for Current	Amps/ A
27	Unit for Potential Difference	Voltage/ V
28	Unit for Resistances	Ohms/ Ω
29	Unit for Power	Watts/ W
30	Unit for Specific Heat Capacity	J/Kg^{0}C

Maths Facts

1	Area of a rectangle	$l \times w$
2	Area of a triangle	$\frac{1}{2} Base \times Perpendicular\ Height$
3	Area of a Parallelogram	$b \times h$
4	Area of a Trapezium	$\frac{1}{2}(a+b) \times h$
5	Area of a circle	πr^2
6	Circumference of a circle	π x $diameter$
7	Area of a sector	$\left(\frac{Angle}{360}\right) \times \pi r^2$
8	Sum of interior angles for a regular polygon	$(number\ of\ sides - 2) \times 180$
9	Interior angle of a regular polygon	$\frac{(\text{number of sides} - 2) \times 180}{\text{number of sides}}$
10	Exterior angle of a regular polygon	$\frac{360}{\text{number of sides}}$

11	Volume of a cuboid	$length \times width \times height$
12	Volume of a prism	$area\ of\ cross\ section \times length$
13	Volume of a cylinder	$\pi r^2 h$
14	Pythagoras' theorem	$a^2 + b^2 = c^2$ a
15	Trigonometry - labelling sides	
16	Trigonometry - right angled triangles	$\sin(x) = \frac{opp}{hyp}$ $\cos(x) = \frac{adj}{hyp}$ $\tan(x) = \frac{opp}{adj}$
17	Percentage change	$\left(\frac{Difference}{Origial}\right) \times 100$
18	Speed	$Speed = \frac{Distance}{Time}$
19	Density	$Density = \frac{Mass}{Volume}$
20	Pressure	$Pressure = \frac{Force}{Area}$