Science

Systems in the Human Body

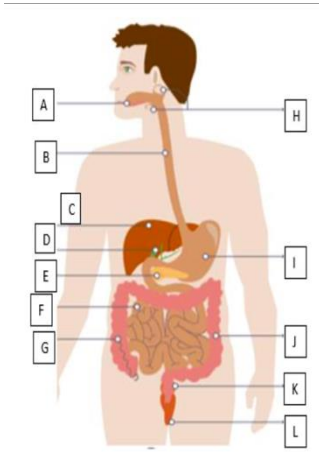
Year 11

Term 3

Your teacher will tell you which topic you should revise. Read and learn all the information in the topic, ready for a Quiz in lesson.

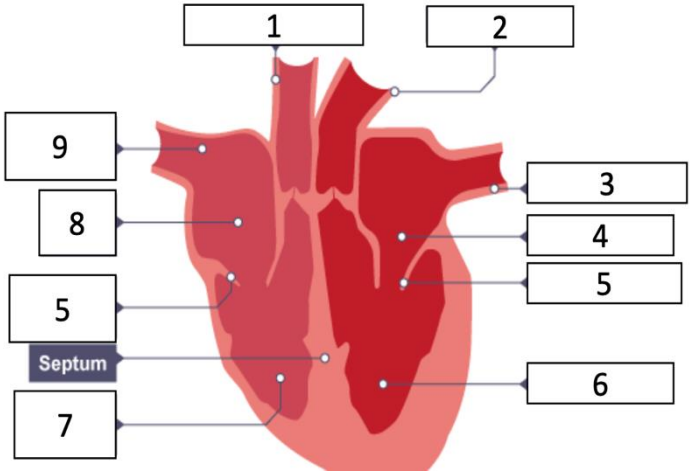
Topic 1:

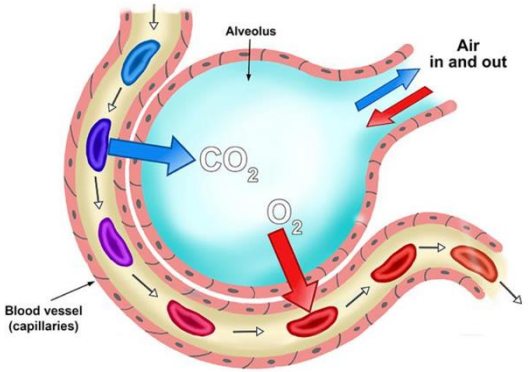
1. Principle of organisation		
Level	Definition	Examples
Cell	Basic building blocks of all living organisms	Cheek Muscle
Tissue	Group of cells with a similar structure and function	Glandular Epithelial
Organ	A group of tissues performing specific functions	Stomach Pancreas
Organ system	A group of organs which work together to form organisms	Digestive system



A	**Mouth**: mechanical breakdown/chew food	**G**	**Appendix**: useless organ which harbours bacteria (good and bad)
B	**Oesophagus** (gullet): push chewed food to stomach	**H**	**Salivary Glands**: produce saliva with amylase enzymes to breakdown starch
C	**Liver:** makes bile	**I**	**Stomach**: Partial digestion of food/mechanically churns food with HCl and protease enzymes
D	**Gall Bladder**: stores bile which breaks down fats (lipids) and neutralises the HCl(stomach acid)	**J**	**Large Intestine**: re-absorption of water
E	**Pancreas**: production of digestive enzymes	**K**	**Rectum**: muscular section of the large intestines
F	**Small Intestine:** absorption of small soluble particles	**L**	**Anus**: where faeces leaves the body

7. The heart		
1	Pulmonary artery	Carries deoxygenated blood to the lungs
2	Aorta	Carries oxygenated blood to the body
3	Pulmonary vein	Brings oxygenated blood from the lungs
4	Left atrium	Pushes blood to left ventricle
5	Heart valve	Prevents backflow of blood
6	Left ventricle	Pumps blood to body
7	Right ventricle	Pumps blood to lungs
8	Right atrium	Pushes blood into right ventricle
9	Vena cava	Brings deoxygenated blood from body





Thin walls	Capillary wall one cell thick
Moist layers	From mucus in alveoli
Large surface area	Many alveoli
High concentration gradient	Blood enters with low O_2 and high CO_2

Science

Homeostasis & Response

Year 11

Term 3

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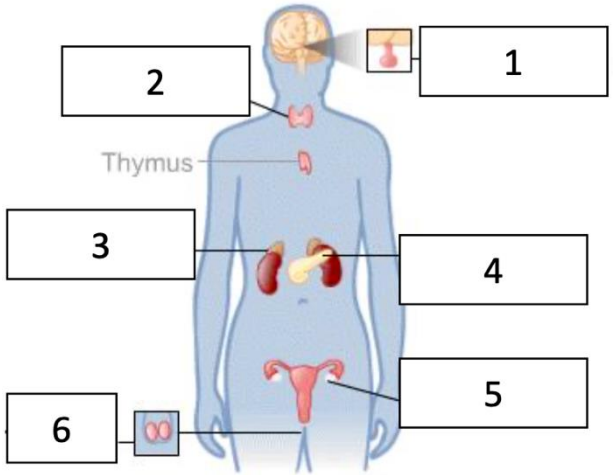
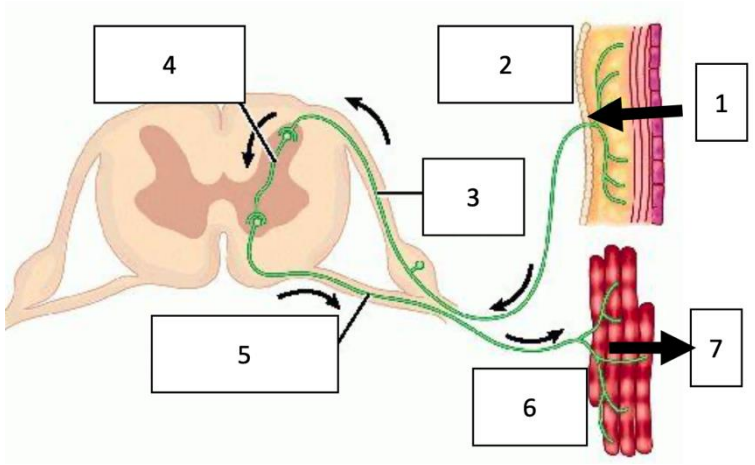
Topic 2:

9. Major glands on the body		
1	Pituitary gland	The 'master gland' makes hormones which affect other glands causing them to secrete hormones
2	Thyroid gland	Controls metabolism
3	Adrenal gland	Makes adrenalin
4	Pancreas	Controls blood sugar levels
5	Ovary	Produces female sex hormones
6	Testes	Produce male sex hormone

2. Nervous system: Reflex arc							
No.	1	2	3	4	5	6	7
Section	Stimulus →	Receptor →	Sensory neurone →	Co-ordinator →	Motor neurone →	Effector →	Response
Definition	A change to the environment that triggers a nervous response	A cell which detects a specific stimulus	A neurones which carries electrical signal from receptor to CNS	The area that receives and processes the information	Neurone that connects the CNS to the effector	The organ that creates the correct response form the stimulus	The effect of the stimulus. Often designed to prevent injury
Example	Touching a flame	Pain receptor in skin	Sensory neurone	Brain Relay neurone	Motor neurone	Muscle gland	Movement



Homeostasis	The regulation of the internal conditions of a cell or organism to maintain optimum conditions for function in response to internal and external changes.
Optimum conditions	The perfect conditions for an organism to survive and grow. E.g. blood glucose level, body temperature and water level.
Nervous response	Uses electrical signal in nerves to make fast changes
Chemical response	Uses hormones in the blood to make changes.
Reflex arc	A nervous response that is fast and automatic for protection. Does not involve the conscious brain.
CNS	(Central nervous system) The brain and the spinal chord
Neurone	Nerve cell. Carries an electrical signal from one end to the other



Science

Inheritance, Variation & Evolution

Year 11

Term 3

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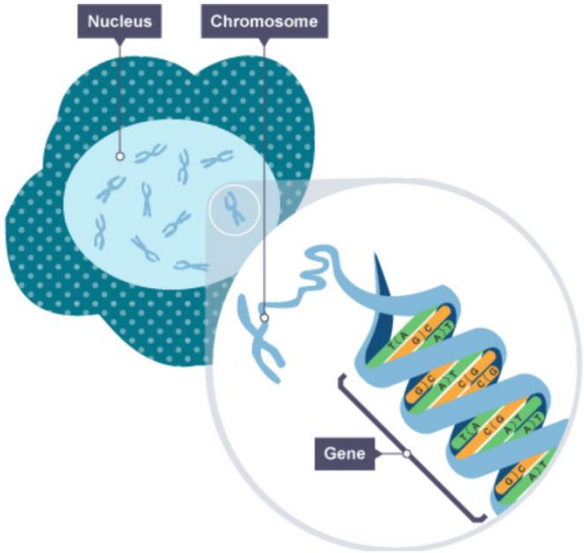
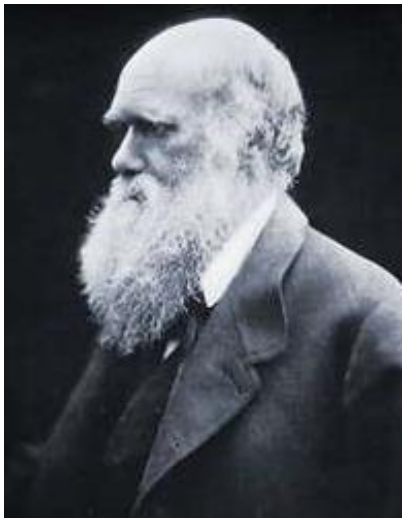
Topic 3:

Allele	Different forms of the same gene. eg hair colour
Dominant	When only one copy of the allele is needed to show in the offspring
Recessive	When the allele only shows when there are two copies
Homozygous	Two copies of the same allele
Heterozygous	Two different alleles
Genotype	The set of genes in our DNA
Phenotype	The outward appearance a set of genes displays





Evolution	The change in the inherited characteristics of a population due to natural selection. May result in a new species
Natural selection	The process where the organism best adapted to the environment survives and passes on their characteristics
Species	A group of organisms with similar features which can breed to make fertile offspring

Stages of evolution
1. Population shows variation due to their genes
2. Environment changes
3. Some individuals are best adapted and live longer
4. These can breed and produce more offspring
5. Over a long period of time the offspring dominate the population

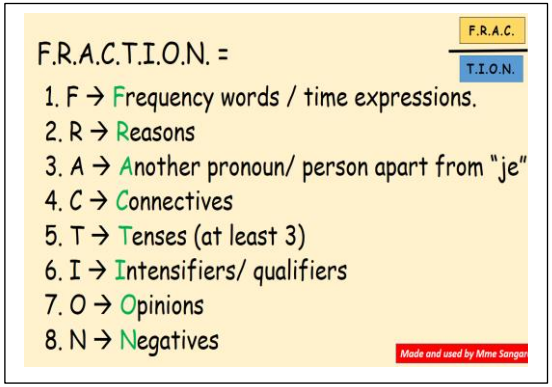
Extinction	When an entire species has died
Causes of extinction	1. Disease 2. New predators 3. Famine 4. Natural disaster (meteor, volcano)

Science
Support and application

Year 11
Term 3

Vocabulary	Wider Research	Apply
1. Cell 2. Tissue 3. Organs 4. Alveoli 5. Respiratory system 6. Cardiovascular System 7. Oxygen 8. Carbon dioxide 9. Endocrine System 10. Gland 11. Hormone 12. Nervous System 13. Neurone 14. Stimulus 15. Receptor 16. Coordinator 17. Effector 18. Response 19. Allele 20. Dominant 21. Recessive 22. Homozygous 23. Heterozygous 24. Genotype 25. Phenotype 26. Evolution	**Systems of the human body:** https://www.bbc.co.uk/bitesize/guides/zwyfxfr/revision/1 https://www.youtube.com/playlist?list=PL9IouNCPbCxXGDt3ATU1xM_X_F8JghPCB **Homeostasis & Response:** https://www.bbc.co.uk/bitesize/guides/zc8qdxs/revision/1 https://www.youtube.com/playlist?list=PL9IouNCPbCxW3lptxS1yHCP2I9YDfM2co **Inheritance, Variation & Evolution:** https://www.bbc.co.uk/bitesize/guides/ztwdgdm/revision/1 https://www.bbc.co.uk/bitesize/guides/zyxm8mn/revision/1 https://www.youtube.com/playlist?list=PL9IouNCPbCxWt28Bifo2jK9xn-ym956sf https://www.youtube.com/playlist?list=PL9IouNCPbCxXqJycGYKJhk2PMKICNBBZ8	1. Why is the heart described as a ‘double pump’? (2 marks) 2. The heart is a type of muscle- what chemical reaction occurs to give the heart energy to pump blood around the body? (1 mark) 3. Why is the left side of the heart muscle bigger than the other side? (2 marks) 4. Compare the nervous system with the endocrine system (4 marks) 5. Name the master gland in the human body (1 mark) 6. Describe how the lungs are adapted to allow exchange of oxygen and carbon dioxide between the air and in blood. (3 marks) 7. Describe the difference between a dominant allele and a recessive allele (2 marks) 8. Describe how evolution takes place in terms of natural selection (4 marks) 9. How do fossils provide evidence for evolution? (2 marks) 10. Why does a dominant allele create a higher probability of an offspring affected by a disease, such as cystic fibrosis? (2 marks)

KS4 Knowledge Organizer. Subject: French.



Raising Standards Leader for KS4: Mrs Allen (sterm029@sflt.org.uk).

Head of Languages Department: Ms Lara (laraе006@sflt.org.uk).

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Revision tips

- Make sure you get some sleep – cognition (acquiring and understanding information) and ability to recall learned facts is limited when you are sleep deprived.
- Eat a healthy, balanced diet - lots of fruit and veg, meats for protein, limit sugary fatty foods.
- Switch off social media/distractions - ignore your phone for a few hours! It will help you keep focused. Social networking, while it's fun, is a big distraction from your revision.
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- Start your revision early - start now, if you have not already done so, not days before your exam.
- Do small chunks of revision. Your brain is not capable of mass storing information in a short space of time. Digesting small chunks of information, over a longer period of time, means you are more likely to remember it

Click on the QR code below which will take you to the revision support page on our website:

French. *Theme 3*: **les études actuelle et future et l'emploi** *(Current and future study and employment)*

Unité 9*:* Mes études *(my studies).*

Unité 10*:* la vie scolaire / la vie au collège et au lycée *(school life / life at school and college)*

Section 1

9.1G L'école et les matières

amusant(e)	fun, enjoyable
l'anglais (m)	English
la biologie	**biology**
le bulletin (scolaire)	school report
le cahier	**exercise book**
la cantine	**canteen**
la chimie	chemistry
la cour	**playground**
le cours	lesson
le dessin	art
les devoirs (m)	homework
difficile	**difficult**
le / la directeur / directrice	headteacher
l'élève (m / f)	pupil
ennuyeux(-se)	boring
l'EPS (f)	PE
facile	easy
faire attention	to pay attention
faire des efforts	**to make an effort**
fatigant(e)	**tiring**

le français	French
l'histoire-géographie (f)	**history-geography**
l'informatique (f)	ICT
l'instituteur (m) / institutrice (f)	primary school teacher
insuffisant(e)	**poor**
intéressant(e)	interesting
la langue	language
les maths (f)	**maths**
la matière	school subject
la musique	**music**
les notes (f)	**marks**
oublier	to forget
la pause-déjeuner	**lunch break**
la physique	physics
le professeur	secondary school teacher
les progrès (m)	**progress**
la récré(ation)	break
sévère	**strict**
utile	useful

J'aime **beaucoup le Français** parce que c'est **vraiment** intéressant et	I like **French a lot** because it is **really** interesting and
le professeur est **très** passionné.	**the teacher** is very passionate.
Je finis **mes devoirs avant** de manger.	I finish **my homework before** eating.
Les professeurs nous donnent **trop de** devoirs.	The teachers give us **too much** homework.
Les élèves font **beaucoup de** bruits.	The pupils make **a lot of** noise.
J'ai **moins de** problèmes en **physique** cette année.	I have **fewer** problems in **physics** this year.

Section 2

9.1F La journée scolaire

acheter	to buy
les affaires (f)	**belongings**
l'animal (m) en peluche	**cuddly toy**
apprendre	to learn
l'arbre (m)	tree
le car	coach
le cartable	**school bag**
commencer	to start
comprendre	to understand
demander	to ask
distribuer	to give out
l'emploi (m) du temps	**timetable**
énerver	**to annoy**

finir	**to finish**
l'ordinateur (m)	computer
la poubelle	bin
le professeur principal	**form teacher**
la quatrième	**year 9**
remarquer	to notice
le sac	bag
la seconde	**year 11**
le singe	**monkey**
la sixième	**year 7**
sonner	**to ring (of bell)**
le tableau	board
le trajet	journey
voyager	to travel

To form **the perfect tense / past tense** of regular –er verbs, you need the correct form of "avoir" in the present tense, followed by the past participle of the verb. Example: the past participle of "manger" is "mangé".
I ate/ I have eaten = **J'ai mangé.**

J'ai travaillé dur au collège.	I worked hard at school.
Mes copains/ mes amis ont mangé de la salade à la cantine.	My friends ate some salad at the canteen.
Le professeur principal a donné des instructions aux élèves.	The form teacher gave some instructions to pupils.
Elle est **plus** grande **que lui**. Il travaille **moins que nous.** Mes amis sont **en seconde comme moi.**	She is tall**er than him.** He works **less than us.** My friends are **in year eleven like** me.
Les vacances vont commencer **après-demain.**	The holidays are going to start **the day after tomorrow.**
Avant-hier, j'ai bavardé avec mes amies.	**The day before yesterday,** I talked with my friends (girls).

Section 3

10.1G La vie scolaire

l'ambiance (f)	atmosphere
avoir raison	to be right
avoir tort	to be wrong
bien équipé	well equipped
le bruit	noise
le car de ramassage	school bus
le / la correspondant(e)	pen friend / exchange partner
distribuer	to hand out
être d'accord	to agree
faire attention	to pay attention
faux / fausse	false
l'inconvénient (m)	disadvantage
l'intimidation (f)	bullying
mieux	better
pas mal de	a lot of / lots of
passer un examen	to sit an exam
pénible	painful, dreadful, annoying
pire	worse
le principal	headteacher
régulièrement	regularly
stressant(e)	stressful
tard	late
le temps libre	free time
tôt	early
vrai(e)	true

Dans les collèges français, **les cours** commencent **plus tôt que** dans les collèges anglais.	In French schools, **lessons** start **earlier than** in English schools.
La pause déjeuner **en Angleterre** est **moins longue que la pause déjeuner** en France.	The lunch break **in England** is **less long than** the **lunch break** in France.
Il travaille **plus vite que** moi.	He works **more quickly than** you.
Elle chante **mieux que** toi. Il parle Allemand **pire que** moi.	She sings **better than** you. He speaks German **worse than** me.
Claire parle **le plus souvent.** Sébastien travaille **le plus lentement**.	Claire speaks **the most often.** Sébastien works **the slowest.**
Le prof de biologie explique **le moins bien.**	The biology teacher explains **the least well.**
C'est faux! / **C'est vrai!** À mon avis, Madame Dupont est une excellente *principale / directrice.*	**That's false/wrong!** / **That's right!** In my opinion, Madame Dupont is an excellent *headteacher.*

Section 4

10.1F Le règlement scolaire

absolument	absolutely
la blouse	overall worn at school
la coiffure	hairstyle
contre	against
corriger	to correct
le côté	side
devoir	to have to, must
le / la directeur / directrice	headteacher
distribuer	to give out
écrire	to write
en arrière	backwards
en retard	late
exprimer	to express
falloir	to be necessary
s'habiller	to get dressed
il faut	it is necessary / you must
interdit	not allowed, forbidden
la laine	wool
la mode	fashion
se moquer de	to make fun of
nettoyer	to clean
obligé(e)	obliged, forced
porter	to wear
pour	for, in favour
pouvoir	to be able, can
le prix	prize
propre	clean
la punition	punishment
la raie	parting (in hair)
la récompense	reward
respecter	to respect
sale	dirty
les vêtements (m) de marque	designer clothes
vouloir	to want

Je **dois** absolument réviser pour mes **mes examens.**	I absolutely **must/ have to** revise for **my exams.**
Dans mon collège, on ne **doit** pas **arriver en retard.**	In my school, we **must** not **arrive late.**
Aussi, les filles ne **peuvent** pas **se maquiller.**	Aussi, girls **can** not **put on make up.**
On ne **peut** pas porter des bijoux.	We **can** not wear jewelleries.
Je **veux** aller à la bibliothèque. Mauricette **veut** voir **sa prof de danse.**	I **want** to go to the library. Mauricette **wants** to see **her dance teacher.**
il faut arriver à l'heure. **il ne faut pas** manger en classe.	**It is necessary to/ you must** arrive on time. **You must not** eat in class.

Section 5

Wider Research	Apply
• Online Dictionary and conjugation tool: www.wordreference.com • Also, please remember that you should spend at least **20 minutes each week, PRACTISING INDEPENDENTLY**, on each of the following app and website: https://www.memrise.com/ https://www.kerboodle.com/users/login If you need support with any of the above learning resources, please email your teacher.	Answer the following questions in French. • it is wise to use words/ expressions that you'll easily remember. **Aim to write 3 sentences as answer per question set – where possible**. Have, on average 30 words in total per answer – where possible. • **Mind the tense** in which each question is set. The tense in your answers should reflect the tense in the question you are answering. **Remember that what you write does not have to be true. Just show off your vocab and grammar knowledge.** **1/ Tu peux décrire ton collège?** (nom, nombre d'élèves, bâtiments) *(Can you describe your school? (name, number of students, buildings))* **2/ Tu peux parler d'une journée typique dans ton école?** (heure de début et fin des cours, récré(ation), pause-déjeuner) *(Can you speak about a typical day in your school? (time when lessons start and end, break and lunch-break times)* **3/ Quelle(s) matière(s) est-ce que tu aimes et pourquoi?** *(What/ which subject(s) do you like and why?)* **4/ Quelle(s) matière(s) est-ce que tu n'aimes pas et pourquoi pas?** *(What/which subject(s) you don't like and why not?)* **5/ Tu peux décrire une visite scolaire ou un voyage scolaire que tu as fait récemment?** *(Can you describe a school visit or a school trip which you did recently?)* **6/ Tu es POUR ou CONTRE l'uniforme scolaire?** *(Are you FOR or AGAINST school uniform?)*

		7/ foundation >>>> Est-ce qu'il y a beaucoup de règles/ règlements scolaires dans ton collège? Tu es d'accord avec ces règles/ règlements scolaires ? *(Are there a lot of rules in your school? Do you agree with them?)* **7/ higher >>>> Si tu pouvais changer quelque(s) règlement(s) scolaire(s) dans ton collège, que changerais-tu?** *(if you could change some rule(s) at your school, what would you change?)* **8/ Tu peux COMPARER la vie scolaire en France et la vie scolaire en Angleterre?** *(Can you COMPARE school life in France and school life in England?)*

KS4 Knowledge Organiser. Subject: Spanish.

Raising Standards Leader for KS4: Mrs Bennett (bailc197@sflt.org.uk).

Head of Languages Department: Ms Lara (larae006@sflt.org.uk).

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Spanish. *Theme 3*: **Estudios actuales y futuros y empleo** *(Current and future study and employment)*

Unidad 9: Mis estudios *(My studies)*

Unidad 10: La vida en el instituto y en bachillerato *(Life at school and college)*

Section 1. The school and the subjects.

9.1G El instituto y las asignaturas			
el arte dramático	drama	*la educación física*	PE
la asignatura	subject	*escoger*	to choose
la carrera	career, university course	*el español*	Spanish
las ciencias	science	*estudiar*	to study
la clase	class	*fácil*	easy
la cocina	cooking, food technology	*el francés*	French
continuar	to continue, carry on	*la geografía*	geography
los deberes	homework	*la historia*	history
dejar	to drop	*el inglés*	English
el dibujo	art	*las matemáticas*	maths
difícil	difficult, hard	*práctico/a*	practical
divertido/a	fun	*próximo/a*	next
		la selección	choice
		útil	useful

Me gusta mucho el español porque creo que es interesante y útil.	I like Spanish a lot because I think it is interesting and useful.
Sin embargo, creo que **la asignatura más** importante es el inglés.	**However,** I think that the most important **subject** is English.
Para mí, las matemáticas son muy difíciles y aburridas.	**For me**, maths are very difficult and boring.
El año que viene creo que voy a continuar con la historia y el inglés.	Next year, I think that I am going to continue with history and English.
El inglés es importante **para mi carrera**.	English it is important **for my career**.

Section 2. How to be a good student?

9.1F ¿Cómo ser buen estudiante?			
abrir	to open	*llevar*	to take, to carry, to wear
afectar	to affect	*mejorar*	to improve
el apoyo	support	*mirar*	to look at
aprender	to learn	*el mundo*	world
los apuntes	notes	*necesitar*	to need
asistir a	to attend	*la nota*	grade
la biblioteca	library	*ofrecer*	to offer
el/la compañero/a	classmate	*el ordenador*	computer
completar	to complete	*organizar*	to organise
consultar	to consult	*la palabra*	word
el debate	discussion	*la pantalla*	screen
los deberes	homework	*participar*	to take part
el diccionario	dictionary	*pedir*	to ask for, to request
la duda	doubt, query	*pegado/a a*	glued to
el ejercicio	exercise	*perder*	to lose, miss
entender	to understand	*la pizarra*	blackboard
la escuela	school	*la pizarra interactiva*	smartboard
esperar	to hope, to wait, to expect	*preguntar*	to ask
el examen, exámenes	exam, exams	*el/la profesor(a)*	teacher
la excursión	trip	*el progreso*	progress
faltar a clase	to miss lessons	*la prueba*	test
la frase	sentence	*repasar*	to revise
intentar	to try	*el repaso*	revision
interrumpir	to interrupt	*responsable*	responsible
el instituto	school	*resultar en*	to end up with, to lead to
levantar la mano	to raise your hand	*saber*	to know
la literatura	literature	*sacar buenas / malas notas*	to get good / bad grades
		serio/a	serious
		las tareas	homework
		el trabajo	work, piece of work

Para **que te vaya bien** en el instituto, **asiste** a todas las clases, **participa** en clase, **pregunta** a tu profesor y **haz** siempre los deberes.	In order to do well in the school, **attend** all the lessons, join in during lessons, ask your teacher and always do homework.

Section 3. My school.

10.1G El día en el instituto	
acabar de	to have just done something
actuar	to perform
el aire libre	the open air
aislado/a	isolated
el/la alumno/a	pupil
aprender	to learn
la asignatura	subject
el bachillerato	A-level equivalent
el bocadillo	sandwich
bonito	lovely
campo de deportes	sports field
la clase	class
el/la compañero/a	classmate
corto/a	short
durar	to last
empezar	to start, to begin
el equipo	team, equipment
el estante	shelf
la evaluación	assessment
funcionar	to work, to function
ganar	to win
ir al baño	to go to the bathroom
el juego de mesa	board game
la hora de comer	lunch hour
el laboratorio	laboratory
la obra de teatro	play
la opción	option
la oportunidad	opportunity
pasar la lista	to take the register
el producto químico	chemical

Mi instituto se llama Greenacre Academy.	My school is called Greenacre Academy.
Es bastante grande y tiene tres patios, un campo de deportes, un gimnasio y una cafetería.	It is quite big and it has three playgrounds, a sports field, a gym and a canteen.
Las clases empiezan a las ocho y media y terminan a las tres.	Lessons start at eight thirty and end at three.
Tenemos un recreo a las once.	We have a break at eleven.
La comida es a la una y veinte.	Lunch is at twenty past one.
Después de las clases hay clubs y actividades deportivas.	After school, there are clubs and sport activities.

Section 4. Rules and uniform.

10.1F Las reglas y el uniforme	
la agenda	diary, planner
el apellido	surname
el artículo	article
la ausencia	absence
buscar	to look for
el chicle	chewing gum
el daño	harm
dejar	to let, allow
demostrar	to show, demonstrate
el edificio	building
escolar	school (adj.)
firmar	to sign
el individuo	individual
las instalaciones	facilities
el intercambio	exchange
llevar	to take, carry, wear
el maquillaje	make up
los materiales	materials
mientras	while
el nombre	name
la palabra	word
el pasillo	corridor
el pendiente	earring
ponerse en contacto	to get in touch
prohibido	prohibited, banned
la puntualidad	punctuality
la regla	rule
el respeto	respect
sufrir	to suffer
traer	to bring
el trayecto	journey
el uniforme	uniform

En mi instituto, **hay que** llevar uniforme.	In my school, **you have to** wear uniform.
Se debe llegar al instituto y a las clases con puntualidad.	**You must** arrive to school and to the lessons on time.
Tenemos que comer en la cafetería.	**We have to** eat in the canteen.
Tenemos que traer los materiales.	**We have to** bring the equipment.
Hay que mostrar respeto.	**You have to** show respect.
Está totalmente prohibido fumar o vapear.	Smoking or vaping **is totally forbidden.**

Section 5

Wider Research	Apply
• Online Dictionary and conjugation tool: www.wordreference.com • Also, please remember that you should spend at least **20 minutes each week**, **PRACTISING INDEPENDENTLY**, on each of the following app and website: https://www.memrise.com/ https://www.kerboodle.com/users/login If you need support with any of the above learning resources, please email your teacher.	Answer the following questions in Spanish. • it is wise to use words/ expressions that you'll easily remember. **Aim to write 3 sentences as answer per question set – where possible**. Have, on average 30 words in total per answer – where possible. • **Mind the tense** in which each question is set. The tense in your answers should reflect the tense in the question you are answering. **Remember that what you write does not have to be true. Just show off your vocab and grammar knowledge.** **1/ ¿Puedes describir tu instituto?** *(Can you describe your school?)* **2/ ¿Puedes hablarme de un día típico en tu instituto?** *(Can you speak about a typical day in your school? -time when lessons start and end, break and lunch-break times)* **3/ ¿Qué asignatura te gusta más? ¿Por qué?** *(What subject do you like and why?)* **4/ ¿Qué asignatura no te gusta? ¿Por qué no?** *(What subject you don't like and why not?)* **5/ ¿Qué hiciste ayer durante el recreo?** *(What did you do yesterday during lunch?* **6/ ¿Qué opinas del uniforme ?** *What do you think about your school uniform?)* **7/ ¿Hay muchas reglas en tu instituto? ¿Por ejemplo?** *Are there many rules in your school? ¿For example?*

Geography
Development and climate change

Year 11
Term 3

Your teacher will tell you which topic you should revise. Read and learn all the information in the topic, ready for a Quiz in lesson.

Topic 1: Urban growth

Megacities

The rapid growth of urban areas in ACs, and more recently in LIDCs, has led to the formation of major, sprawling urban settlements with populations of over **10 million people.** These megacities have grown in number over time, from just 2 in 1950 (New York and Tokyo) to over 30 presently.

Advantages:

- More job opportunities
- High wages
- Good quality of life
- Good transport links
- Up to date technology

Disadvantages

- High cost of living
- Large gap between rich and poor
- High levels of crime
- Air pollution
- Too many people living in one place may lead to conflict or shortage of supplies

World cities

World cities are very influential cities that have a key role in the global economic system. They usually have the following characteristics:

- Headquarters of TNCs
- Centre of innovation in business
- Centre for media and communications
- Centre for manufacturing
- Important port facilities for bulk carriers
- Home of important stock exchange or major banks
- Regional importance compared to other cities
- Highly rated universities
- Excellent quality healthcare
- Cultural importance and opportunities such as live music and theatre

Issues with rapid urbanisation

- Cities often grow in a planned way, but many cities, particularly those in LIDCs, attract people in such large numbers that the city's infrastructure cannot cope with all the new arrivals.
- Any available land is used for housing but there is a lack of services, particularly sanitation and healthcare. The high density of population leads to an increased crime rate and employment is unreliable with little working rights.
- In LIDCs, migrants often build houses on land which does not belong to them. This is land that is not suitable for building on, such as unstable steep slopes and will be at risk of flooding and landslides.

Geography
Development and climate change

Year 11
Term 3

Your teacher will tell you which topic you should revise. Read and learn all the information in the topic, ready for a Quiz in lesson.

Topic 2: Rosario, Argentina case study

Case study - Major city in an EDC – Rosario, Argentina

Rosario is a city in Argentina, South America. Argentina is an Emerging Developing Country (EDC).

Rosario is a 'socialist city' and has close links with trade unions because of its industrial history.

- Shopping – investment has brought lots of shops in order to attract young people and families.
- Tradition – Argentina has a close cultural connection to meat and cowboys are an important part of the country's culture.
- National Flag – the city is known as the 'cradle of the flag' as the Argentinian flag was created in the city

Influence of migration and its impact of the city:

- Rosario has attracted many people from across Argentina due to its commerce, industry and the prospect of employment.
- An influx of migrants in the late 19th century led to an increase in industrial growth and economic activity
- Many Italian immigrants have entered Rosario over the last 100 years – this has influenced the city's culture, food and architecture.
- Italian immigration has added to Rosario's growing crime problem due to gang and Mafia activity.

Influences and development of the city:

- Third most populous city in Argentina with an estimated population of just over one million.
- In the 17th century, livestock were farmed & the city developed its farming.
- In the 19th century, export goods increased, as migrant workers arrived.
- The city is made up of six districts.
- Regional transport links Rosario with other cities through a number of major roads as well as rail and air transport links.

Contemporary challenges facing Rosario:

- Social inequality and informal housing – slum housing on the outskirts of the city house over 100,000 people. There is high population density and poor sanitation in these areas as well as poor healthcare and low quality of life.
- Waste management - due to the growing population and the informal housing, managing waste has become a problem. Excess waste, poor sanitation and improper disposal of waste has led to many social and environmental impacts.
- Crime and unemployment – lots of drug use and violence in Rosario; its reputation has been damaged by its association with crime. Many traditional industries, including chemical and steel plants, closed in 2000 leading to high unemployment.

Geography
Development and climate change

Year 11
Term 3

Your teacher will tell you which topic you should revise. Read and learn all the information in the topic, ready for a Quiz in lesson.

Topic 3: Climate change

Evidence for Climate Change

Global temperature data
There is a warming trend for most of the world. Temperatures near the North Pole have risen the most.

Paintings and diaries
Historical records, such as paintings and diaries, can provide additional evidence of climate change. Several painters at the time of the Little Ice Age captured the winter landscapes of ice fairs and markets on the River Thames.

Tree Rings
Every year the growth of a tree is shown by a single ring. The narrower the ring the cooler and drier the year. If it is thicker the temperature was warmer and it was wetter.

Ice cores
Buried layers of snow are compressed and gradually turned into ice. The water molecules in the ice can be tested and the scientists can work out the global temperature at the time the snow fell. This gives us a temperature record of over 400,000 years.

Example of an impact of this climate change: Tuvalu
Tuvalu is a collection of 9 tiny islands that could all flood due to climate change. Water supply is an issue as droughts occur. The people of Tuvalu are responding by moving to New Zealand as environmental refugees and trying to restore damaged coral.

Consequences of Climate Change

Social impacts	Economic impacts	Environmental impacts
Sea level rise will lead to: - Vulnerable people having to move home due to risk of flooding and storm damage. - People losing their jobs in fishing and tourism. - Increase in number of refugees.	Sea level rise will lead to: - Cities like Venice and London being flooded. - Agricultural land being flooded or polluted by sea water. - Transport systems disrupted. - Beaches eroded and hotels forced to close.	Sea level rise will lead to: - Fresh water being contaminated by sea water. - Damage to mangrove swamps and coral reefs (eg bleaching). - Harbours being blocked by sediment.

Greenhouse gas levels in the atmosphere are increasing by burning fossil fuels, deforestation and emissions from vehicles.

The Earth's atmosphere behaves like a greenhouse:
- Heat as short-wave solar radiation travels to reach the outer atmosphere.
- As it passes through the atmosphere some is reflected back into the atmosphere. The rest reaches the Earth's surface and is absorbed.
- This warmth is then released in the form of long-wave infrared radiation.
- Some of this is absorbed by liquids and greenhouse gases in the atmosphere and some escapes to space.
- The more greenhouse gases (carbon dioxide, methane, nitrous oxides) there are in the atmosphere, the more infrared radiation is Greenhouse gas levels in the atmosphere are increasing by absorbed and the warmer it gets.

Geography
Development and climate change

Year 11
Term 3

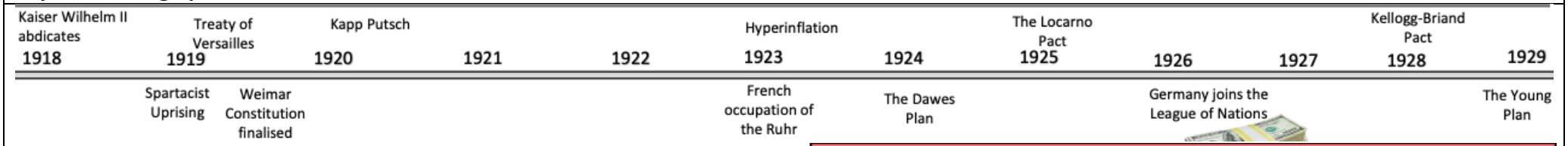
Vocabulary	Wider Research	Apply
1. AC 2. Climate 3. Cost of living 4. Crime 5. Development 6. Drought 7. EDC 8. Education 9. El Nino 10. Global warming 11. Greenhouse gases 12. Healthcare 13. Immigration 14. Industry 15. Informal housing 16. La Nina 17. LIDC 18. Megacity 19. Migration 20. Pollution 21. Rapid urbanisation 22. Rural 23. Sanitation 24. Settlement 25. Standard of living 26. Unemployment 27. Urban 28. Urban growth 29. Waste management 30. World city	**Megacities** https://www.youtube.com/watch?v=JDS_BqDeZ4k **World cities** https://www.youtube.com/watch?v=bfUH2DKUoeI **Urbanisation** https://www.youtube.com/watch?v=ZGrriw-jzPI **Rosario, Argentina** https://www.youtube.com/watch?v=NTD5e5X4qfA **Climate change** https://www.youtube.com/watch?v=EuwMB1Dal-4 **Climate change – causes and effects** https://www.youtube.com/watch?v=G4H1N_yXBiA **Climate change – Svalbard** https://www.youtube.com/watch?v=5zSNSxjCwZ0	**Using your wider research complete the following exam questions** 1. State two advantages of a megacity. (2 marks) 2. Describe the characteristics of a world city. (3 marks) 3. Explain the influence of migration on the city of Rosario. (6 marks) 4. "Social inequality and informal housing is the biggest contemporary challenge facing Rosario" To what extent do you agree with this statement? (8 marks) 5. Describe the human causes of climate change. (3 marks) 6. Explain the greenhouse effect. (3 marks) 7. Assess the consequences of climate change. (6 marks) **Create some revision material** • Create an annotated diagram to show the greenhouse effect and the enhanced greenhouse effect. • Create a set of flash cards that show the differences between megacities and world cities. • Create a large mind map to show the contemporary challenges facing the city of Rosario.

History
Revision: Weimar and Nazi Germany (Paper 3)

Year 11
Term 3

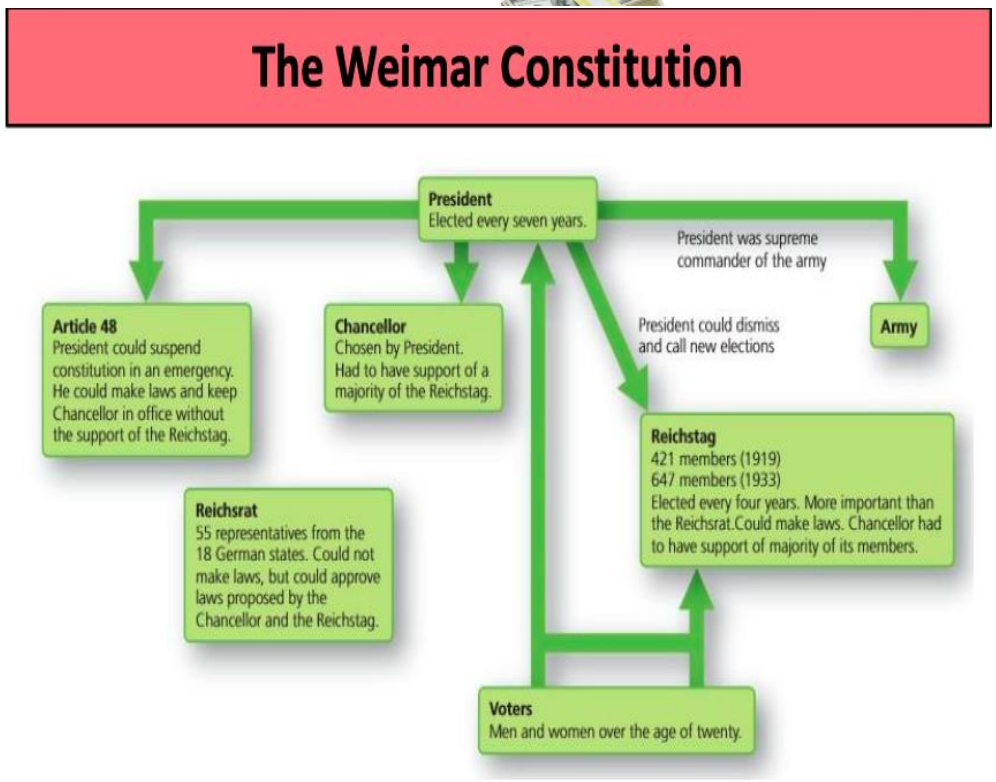
Your teacher will tell you which topic you should revise. Read and learn all the information in the topic, ready for a Quiz in lesson.

Topic 1: Setting up the Weimar Government



Aftermath of WW1:
After WWI a new government was established in Germany, which was accountable to the Reichstag rather than the Kaiser. To establish peace after WWI the USA insisted that the Kaiser was removed from power. On the 9th November, Kaiser Wilhelm abdicated. The new government was led by Chancellor Friedrich Ebert and agreed to Armistice based on America's Fourteen Points.

In January 1919 an election took place but no party had a direct majority. They had to form a coalition which Ebert (of the Social Democratic Party –SPD) became President of. They joined with the Catholic Centre Party (ZP) and the German Democratic Party (DDP). A coalition meant that there were some weaknesses to the government.



The Treaty of Versailles
Germany was severely punished by the terms of the Treaty of Versailles. The key points were:

- Germany had to accept full blame for the war. This was known as the 'war guilt clause.'
- Germany had to pay full reparations for the damage caused by the war. This was later calculated to be £6.6 billion.
- Alsace-Lorraine, which had been taken from France by Germany in the 1871 war, was returned to the French.
- Germany was only allowed to have 100,000 soldiers, no tanks and no air force. Their navy could only have 6 battleships.
- The Rhineland, an area of Germany on the border with France, was demilitarised.
- Anschluss was banned.

The German people felt the government had stabbed them in the back (Dolchstoss). They called the government the November Criminals.

History
Revision: Weimar and Nazi Germany (Paper 3)

Year 11
Term 3

Your teacher will tell you which topic you should revise. Read and learn all the information in the topic, ready for a Quiz in lesson.

Topic 2: Challenges to the Weimar Government

The Uprisings

The Spartacists, in January 1919, inspired by the leftwing Bolshevik revolution in Russia, set up the Communist Party and tried to overthrow the government. This was put down by the Reichswehr & the Berlin Freikorps

The Kapp Putsch (right-wing) was attempted in March 1920. Ebert wanted to disband the Freikorps so they joined with the Reichswehr in Berlin. Led by Wolfgang Kapp they seized Berlin. Ebert asked Trade Unionists & Civil Servants not to support it, and the Putsch collapsed.

Problems of 1923

When Germany couldn't pay their reparations, the French moved into the Ruhr to take goods for themselves. The Germans went on strike & sabotaged their work, setting factories alight and breaking pumps. This meant that production from the Rhineland was very slow, making Germany poorer.
The government printed more money to pay the strikers and their reparations which, coupled with the slow production in the Ruhr, led to hyperinflation where the currency became virtually worthless.

Economic Recovery

In 1923 Gustav Stresseman was Chancellor and is largely credited with the economic recovery of Germany. The Dawes Plan changed the reparations schedule to something which was more manageable. It also meant that French troops would leave the Ruhr. The Rentenmark was the new currency, issued in limited amounts. Once it worked for a year, it was converted to the Reichsmark, based on gold reserves. The Young Plan was developed by US banker, Young. He reduced the reparations figure and extended the time the Germans had to pay it.

Foreign Recovery

The Locarno Pact helped German relations with France, Britain, Belgium & Italy by agreeing borders. The League of Nations agreed to admit Germany in 1926. The Kellogg-Briand Pact was signed in 1928, along with 64 other countries. It said they could have armies for self defence and would resolve disagreements peacefully.

Changes in Society

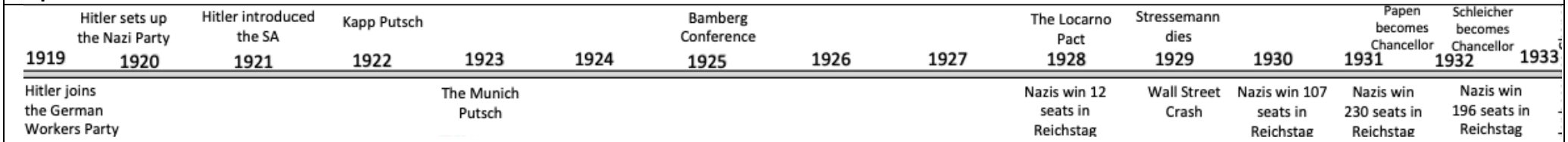
Wages had increased by over 10% by 1928. Although this helped the working class, the middle classes had been bankrupted by hyperinflation. Unemployment amongst the middle class increased. More houses were being built: 2million + between 1924- 1931, which reduced homelessness. Women were given the vote and could work in a variety of areas: teaching, civil service etc. Art, architecture, literature and theatre began to change and become richer & more diverse.

History
Revision: Weimar and Nazi Germany (Paper 3)

Year 11
Term 3

Your teacher will tell you which topic you should revise. Read and learn all the information in the topic, ready for a Quiz in lesson.

Topic 3: Hitler's Rise to Power 1919-1933



Hitler's Early Life

Hitler was born in 1889 in Austria. When his father died in 1903, it brought him closer to his mother. During 1907, she died and Hitler was turned away from the Academy of Fine Arts Vienna. Following this, he made a living by painting postcards whilst sleeping rough. He fled to Germany and joined the German Army, winning the Iron Cross twice. By the end of WWI, he was temporarily blinded by a gas attack.

The Growth of the NSDAP

Hitler became an informant for the Army after WWI. He was asked to spy on the DAP. The leader of the DAP, Anton Drexler, was so impressed with how he spoke that he asked him to join. Hitler spoke about Dolchstoss, his hatred of the Weimar Republic and about anti-Semitism. After 1920 'National Socialist' was added to the party's name & Hitler and Drexler wrote the Twenty Five Point Plan, containing ideas about nationalism, pure German blood and anti-Semitism. This went on to become the party's manifesto. Membership to the party continued to grow with Hitler as leader.

The Munich Putsch

Hitler introduced the Sturmabteilung (SA) in 1921 to control violence at political meetings and to intimidate political opposition. In 1923 he began to plan a coup where he would seize political power from the Bavarian government, (Kahr, Lossow & Seisser) before marching on Berlin and seizing power from the Weimar government. He had watched Mussolini do this in Italy & began to make plans, with support from General Ludendorff.

In reality, the Munich Putsch failed after the alarm was raised and the SA were no match for the Army. Hitler ended up in Landsberg Prison in 1924 for 9 months. He had used his trial to gain political celebrity and whilst in prison reached two turning points: 1) he needed to gain power legally and 2) he wrote Mein Kampf which went on to be the pinnacle of his politics.

History
Support and application

Year 11
Term 3

Vocabulary	Wider Research	Apply
1. Reichstag 2. Kaiser 3. Abdication 4. Chancellor 5. Ebert 6. Armistice 7. Fourteen Points 8. Dolchstoss 9. November Criminals 10. Sparticists 11. Kapp Putsch 12. Freikorps 13. Rhineland 14. Ruhr 15. Hyperinflation 16. Treaty of Versailles 17. Reparations 18. War Guilt Clause 19. Gustav Stresemann 20. Dawes Plan 21. Young Plan 22. Rentenmark 23. Reichsmark 24. Locarno Pact 25. League of Nations 26. Kellog-Briand pact 27. SA Sturmabteilung	The Weimar Republic https://www.bbc.co.uk/bitesize/guides/z9y64j6/revision/1 Hitler's Rise to Power https://www.bbc.co.uk/bitesize/guides/z3bp82p/revision/1 Short History Revision Notes https://www.tutor2u.net/history/collections/edexcel-gcse-weimar-and-nazi-germany-1918-1939 Revision Video https://www.youtube.com/watch?v=liZDYPRt-M4	1. Create a key word glossary using the vocabulary. Key Word | Definition 2. Give two things you can infer from source A about German reactions to the Versailles peace treaty. (4 marks) **SOURCE A** *From a speech by Count Brockdorff-Rantzau, head of the German Versailles delegation to the Allied powers, 7 May 1919.* We shall be made to pay and, as the guilty, we shall be punished. We are required to admit that we alone are to blame for the war. Such an admission on my lips would be a lie. We emphatically deny that Germany, whose people were convinced that they were waging a war of defence, should be burdened with the sole responsibility for the war. One thing I can infer … Evidence from the source … Second thing I can infer …. Evidence from the source … 3. Explain why there were challenges facing the Weimar government between 1919 and 1929. (12 marks) 4. Create a timeline of the key events in Germany after WW1. On your timeline add images, colour and description of the key events.

KS4 Knowledge Organiser
Subject: Engineering WJEC
Year 11 Term 3

Mrs Allen **Raising Standards Leader for KS4**	**sterm029@sflt.org.uk**
Mr Wells **Head of Year 11**	wellj253@sflt.org.uk
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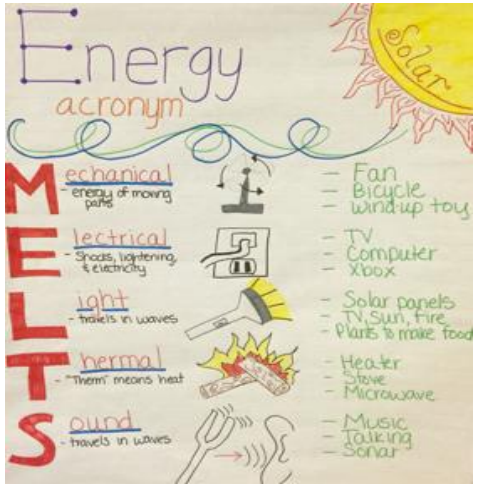
How to use the Knowledge Organiser:

- Your teacher will direct you to what topics to revise for each week
- You will be expected to revise for at least 30 minutes each evening
- Ask someone to quiz you on the key information
- Remember to APPLY the information using the tasks included in each Knowledge Organiser

Also, please remember, you should spend 20 minutes on the following apps and websites:

- GCSE Pod
- PIXL Lit
- PIXL Maths App
- Tassomai
- BBC Bitesize
- Onmaths
- Corbett Maths
- English Instagram @greenacreenglish
- Quizlit

If you would like support with any of the apps, please email ….
akehr005@sflt.org.uk

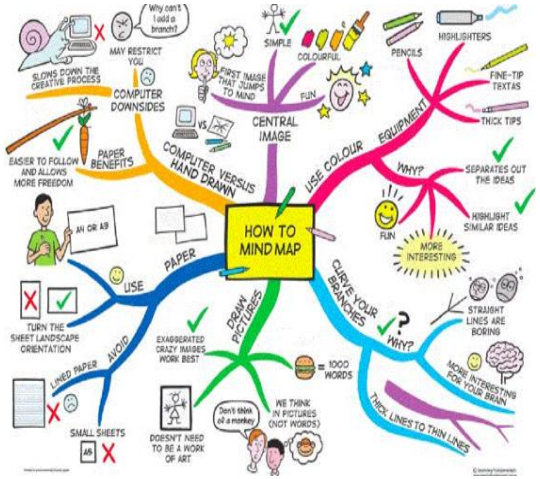


Revision techniques and strategies

Revision tips

•Make sure you get some sleep – cognition (acquiring and understanding information) and ability to recall learned facts is limited when you are sleep deprived.
•Eat a healthy, balanced diet - lots of fruit and veg, meats for protein, limit sugary fatty foods.
•Switch off social media/distractions - ignore your phone for a few hours! It will help you keep focused. Social networking, while it's fun, is a big distraction from your revision.

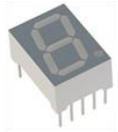
•Turn your huge amount of revision notes into small and easy to handle
•Put a question on the front of your flash cards and write the answer on the reverse – then ask someone to quiz you
•Mind map – what is the topic and what are the key points you need to remember? You could use different colours for different ideas/characters
•A question a day – complete an exam question, under timed conditions, each day
•Record yourself reading your notes and listen back to yourself
•BUG the question – write out exam questions, examine the key words and plan an answer
•Use of post-it notes – place post-it notes in key places so you are constantly reading key information
•Make lists of important facts and figures
•Draw diagrams to help you visually remember your notes
10. 'Look, cover, say, write, check' – use this method to make sure that you are remembering key information



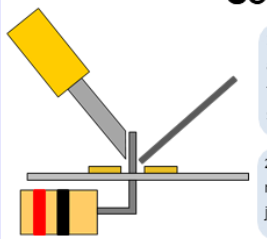
•Give yourself a nice space to work in - have a nice, organised study space with lots of stationary to help you make quality notes/highlight.
•Make a plan - schedule dedicated study time into your daily schedule. Be organised with your time. Stick to your plan. Sacrifice some of your social time for study time. No pain, no gain!
•Start your revision early - start now, if you have not already done so, not days before your exam.
•Do small chunks of revision. Your brain is not capable of mass storing information in a short space of time. Digesting small chunks of information, over a longer period of time, means you are more likely to remember it

Click on the QR code below which will take you to the revision support page on our website:

Output Components

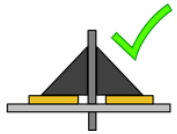
Solenoid	Motor	Light Emitting Diode (LED)	7 Segment Display
			
Convert electrical power in to mechanical movement (pin moves in or out)	Converts electrical power to rotary motion. Direction can be reversed by reversing the supply polarity.	Provide light is a range of colours and sizes. Current must be controlled with a resistor.	Consists of 7 LEDs that can be programmed to display numbers.
Liquid Crystal Display (LCD)	**Loudspeaker**	**Piezo Sounder**	**Buzzer**
			
They have a larger range of characters available than LEDs. They are programmed using an IC.	Uses an electromagnet to move a cone at the frequency of the sound being generated.	Has a piezo-electric diaphragm that distorts rapidly when an AC signal is connected., causing sound.	Produces a sound when electrical current is applied.

Soldering



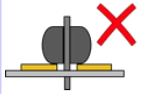
1. **Tin** the soldering iron. This involves applying a small layer of solder to the tip of the iron and then cleaning it off, the tip should appear **shiny** all around.

2. The component leg should be **straight**, do not **bend** the leg as this can lead to **weak** joints.



3. Turn the PCB over so the component is lying **flat** on the **heat proof mat**.

4. Apply the soldering iron against the component leg. From the other side apply enough solder to form a neat **volcano** shaped joint.

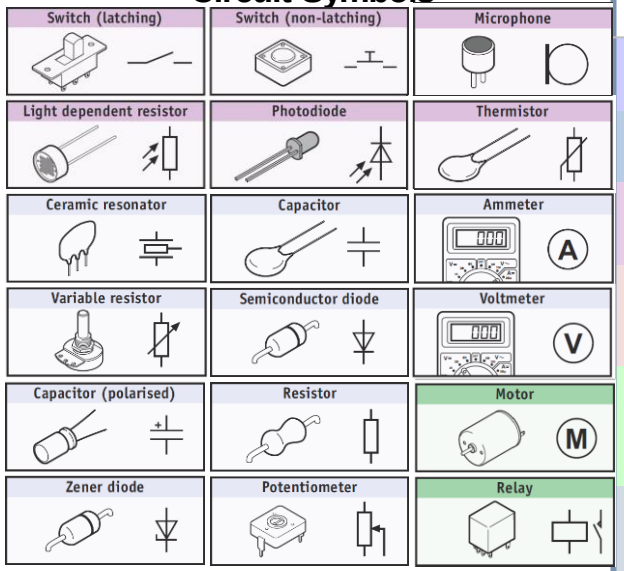


Dry Joint
A weak joint where the solder has not bonded correctly.

5. Use a **damp** sponge to clean the tip of the soldering iron.

Components should be soldered from **SMALLEST** to **LARGEST**

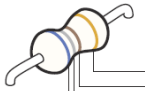
Circuit Symbols



Calculations

Ohms Law	$V = I \times R$ (V in volts, I in amps, R in ohms)
Power	$P = V \times I$ (P in watts, V in volts, I in amps)
Resistors in Series	$R_{total} = R_1 + R_2 + R_3$ (R is ohms) (the same formula can be used for capacitors in series)
Resistors in Parallel	$\frac{1}{R_{total}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$ (R in ohms) (the same formula can be used for capacitors in parallel)
Potential Divider	$\text{Voltage Out} = \frac{R_2}{R_1 + R_2} \times \text{supply voltage}$ (V in volts, R in ohms)
Time Constant	$1.1 \times R \times C$ (R in ohms, C in farads)

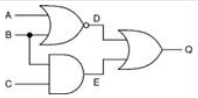
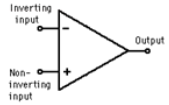
Resistor Colour Codes



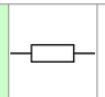
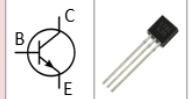
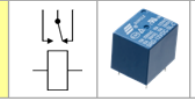
Black	0	0	Black x1	Silver ±10%
Brown	1	1	Brown x10	Gold ±5%
Red	2	2	Red x100	
Orange	3	3	Orange x1000	
Yellow	4	4	Yellow x10,000	
Green	5	5	Green x100,000	
Blue	6	6	Blue x1,000,000	
Violet	7	7		
Grey	8	8		
White	9	9		

Example shown:
blue, grey, brown, gold
= 680R ±5%

Integrated Circuits (ICs)

Voltage Regulator	Logic Gates	PIC microcontroller
 A voltage regulator is used to supply a specific voltage that does not fluctuate. This is needed by some components.	 Logic gates are a means of making a decision or reasoning within a circuit. (see the separate card for types).	 PICs are ICs that can be easily programmed to carry out a task. They have a number of pins for inputs and outputs.
Operational Amplifier (Op-Amp)	**555 Timer**	**Darlington Drivers**
 An Op-Amp will apply the difference in voltage between two inputs and send the result to the output.	 A 555 timer can be used to send a single pulse (**monostable**) or a stream of pulses (**astable**) to an output.	 Is an array of Darlington pair transistors that are used to boost output power. They can be cheaper than separate transistors.

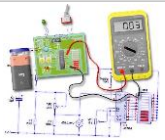
Discrete Components

	Resistors are used to **limit** the amount of current flowing in the circuit and to set **voltage levels** in certain parts of the circuit. Measured in **ohms** (Ω). 1R = 1 ohm I 1K = 1,000ohms I 1M = 1,000,000ohms
	Capacitors are used to store electrical charge. They are used to create **time delays** (monostable), **control the frequency** of pulse generators (astable) and **smooth the input** across a power supply. The unit of measure is **the farad** (F). 1microfarad (μF) = 0.000001F (10^{-6} F) 1 nanofarad (1nF) = 0.000000001F (10^{-9} F)
	Diodes allow current to flow through them in only **one direction**. They are used to protect components from the possibility of **incorrect battery polarity** and to **stop feedback** from outputs.
	Transistors are used as **electronic switches** and to **amplify current**. There are two types; NPN and PNP, the difference is the direction of current flow.
	A relay is used to power a separate output circuit once the relay coil is powered by the input circuit. For this reason, relays are a safe way to **power high-voltage outputs with a low-voltage input**.

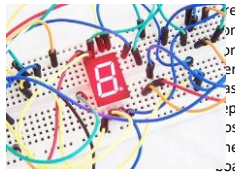
REVISION TOP TIPS

1. **Study in a quiet**, comfortable place away from the TV and computers.
2. Make a **'revision timetable'** and always let your family know when you are revising.
3. Create **summary notes** and anything simple that helps your **memory** – as short notes, drawings and sayings are much easier to remember.
4. **Get help**. Ask friends and family to **test you**. Also attend any teacher **revision classes** – as teachers will know better than anyone what will be in tests and exams!
5. **Record yourself** reading notes **and occasionally listen** to them instead of reading.
6. Take a **5 or 10 minute break** every hour and do some stretching exercises, go for a short walk or make yourself a drink.
7. Allow yourself some fun-time each day to **relax**...and make sure you get a good **8 hours of sleep** each night.
8. **Eat well**. Good brain foods? Wholegrain foods (cereals, wheat bran and whole wheat pasta). Blueberries. Blackcurrants. Broccoli. Tomatoes. Oily fish. Nuts.
9. **Don't panic** if you feel a bit nervy. A certain amount of **nervousness actually helps you perform** to the best of your ability, producing a rush of adrenaline that helps you to feel alert and focused.
10. **Think positive** – if you have given yourself enough time to revise, you will do well!

Circuit Design



Simulating a circuit on the computer has many benefits. It can take far less time and gives accurate test results before the circuit is made. Faults can be quickly identified and corrected.



Breadboarding is a quick method of testing a circuit. Breadboards are a temporary construction method, meaning components are not permanently attached so it is still easy to move them around or to replace them in order to evaluate possible improvements to the circuit. They are a board covered with small sockets into which components can be plugged.

Breaking a task into input-process-output sections and looking at what specific functions are needed at each stage allow you to pick the necessary components for each area. You should start by looking at the inputs and outputs you need and then determining what an appropriate process would be.

Ohms Law

Voltage = Current x Resistance

E.G. What current passes through a 180R resistor if the voltage across it is 9 volts?

I = V ÷ R

I = 9V ÷ 180R

I = 0.05A or 50mA

Voltage must always be in VOLTS (v)

Convert mV into V = ÷ 1,000 OR $x10^{-3}$

Current must always be in AMPS (A)

Convert mA into A = ÷ 1,000 OR $x10^{-3}$

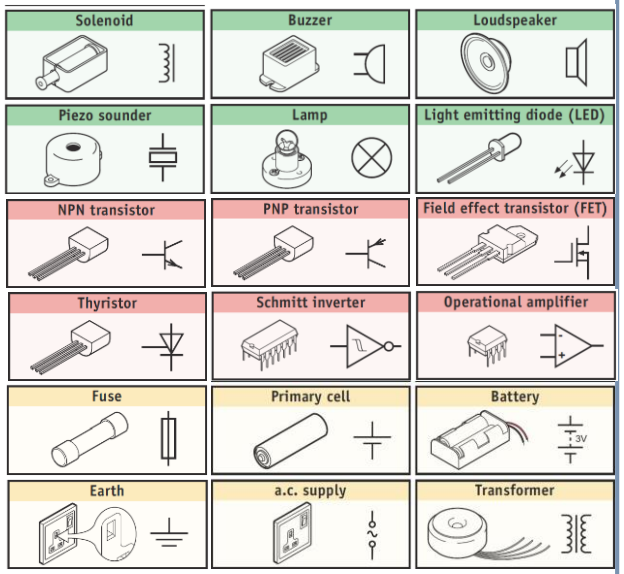
Convert μA into A = ÷ 1,000,000 OR $x10^{-6}$

Resistance must always be in OHMS (R)

Convert K into R = x1,000 OR $x10^{3}$

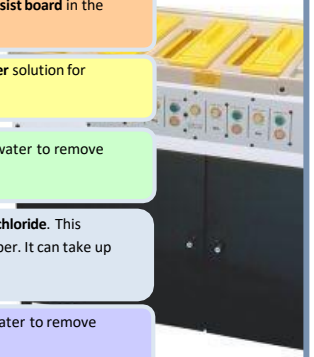
Convert M into R = x1,000,000 OR $x10^{6}$

Circuit Symbols



Etching Process

1. Print the **artwork** for the mask onto acetate sheet using a laser printer.
2. Place the mask and a piece of **photo resist board** in the **UV light box** for 3½ minutes.
3. Place the photo resist board in **developer** solution for around 30 seconds.
4. **Rinse** the photoresist board with cold water to remove developer solution.
5. Place the developed board in the **ferric chloride**. This process will remove any unnecessary copper. It can take up to an hour.
6. **Rinse** the completed board with cold water to remove the ferric chloride.
7. The PCB is now ready to have the **holes drilled**. Remember to use a 1mm drill bit for components and 3mm for any strain relief holes.



Power Sources

Batteries convert **chemical energy into electrical energy**. They are available in different sizes and voltages. Some are rechargeable. They **must be recycled** as they are harmful in landfill.

Battery life can be determined by;

$$\frac{\text{Expected current draw from component (mA)}}{\text{Battery current rating ((mAh)}}$$

Solar cells are commonly used in **garden lighting** systems and for **powering street signs and lights**. They use light to produce electricity. They are a **renewable source** of energy, therefore are good for the environment.

Mains power uses electricity produced by the national grid. The electricity is produced using oil or coal, therefore typically is **non– renewable**. Adaptors can be used to provide a range of voltages.

Capacitors are available in large values, they are called super-capacitors and are measured in farads rather than microfarads.

They charge quickly and hold their charge until needed. They can be recharged as many times as needed. However, they do loose their charge quickly.

Input Components

SWITCHES			
 Slide Switch	 PTB and PTM	 Microswitch	 Tilt Switch
 Key Switch	 Toggle Switch	 Reed Switch	 Rotary Switch

SENSORS			
Light	**Heat**	**Sound**	**Optical**
			
Light Dependant Resistors (LDR)	Thermistor	Microphone	Passive Infrared Sensor (PIR)

Processing Key Words

Digital Electronics Signals with only two states, **on/off** or **high/low** or **1/0.**

IC Integrated Circuit, with no external components needed.

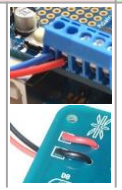
Pull-up Resistor Digital systems require a signal to be high or low, a resistor can be used to ensure that a signal is always either high or low.

Monostable Provides a single pulse that stays switched on for a certain length of time and then stays off until it is switched on again. The output remains in a low stable state until it is switched on, then it remains in a high stable state.

Bistable flip-flop A bistable flip-flop or latch is a circuit that has two stable states and can be used to store state information. A flip-flop is a bistable multivibrator. The circuit can be made to change state by signals applied to one or more control inputs and will have one or two outputs.

Astable Gives a pulsed digital output, it is a pulse generator. For example, it can be used to cause an LED to flash. Therefore, the output is not stable in either the on or the off state.

Construction Methods

Selection of Components	Mounting Components
A circuit diagram is useful in choosing components, but it is not always specific, such as the type of switch. Sometimes compromises have to be made dependant on availability or price.	Most components will be mounted directly to the PCB. Delicate components should be mounted to using a holder (like a 555 timer). 
Off-board Components	**Connection Between Boards**
Off-board components should be soldered on to wire. They can then be connected using terminal blocks or soldered directly. They should use strain relief holes. 	The simplest method two connect two or more boards is using ribbon cable. One connector is fixed and the other is plugged in 

Quality Control

A PCB should always be checked for quality. A snag sheet can be used to test for faults. A PCB can be tested with a multimeter which allows current at certain parts of the circuit to be tested, it can help identify faults.

Electronic components Knowledge organiser

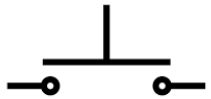
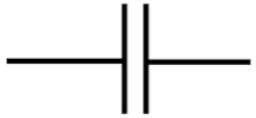
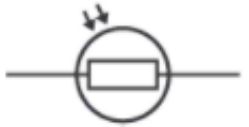
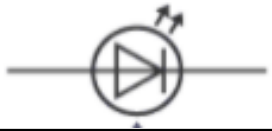
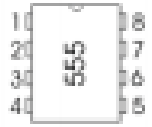
WJEC Engineering textbook p162-163

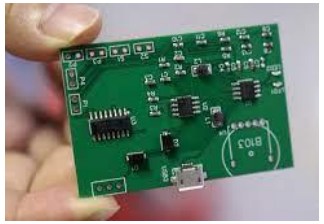
There are many electronic components that make up circuits.
These are **some** of the components that you may be tested on in your Engineering exam.

When designing and drawing circuits, circuit symbols are used to identify the components.

Useful websites:
Technology student

BBC bitesize

Component photo	**Component name**	**Purpose in a circuit**	Circuit symbol
	Resistor	To limit the current and to control the flow of current to other components	
	Push switch	To turn a circuit on and off	
	Capacitor	It stores and releases electricity in a circuit.	
	Light dependent resistor (LDR)	The resistance of a LDR depends on light intensity.	
	Lamp	An electrical current heats the filament in a bulb so that it gives out light.	
	Light Emitting Diode (LED)	Produces light when electricity passes through it (in one direction only)	
	Integrated circuit (IC)	performs high-level tasks such as amplification, signal processing, or calculations	



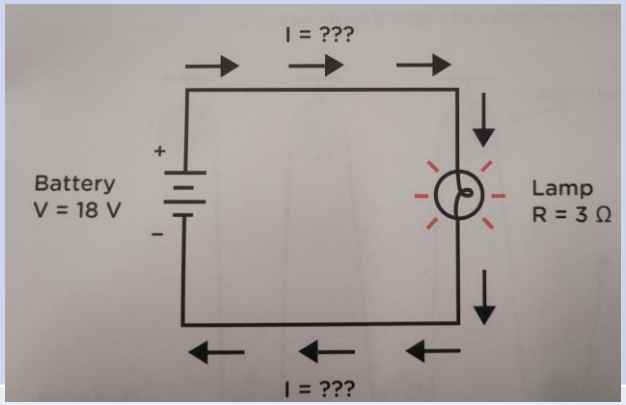
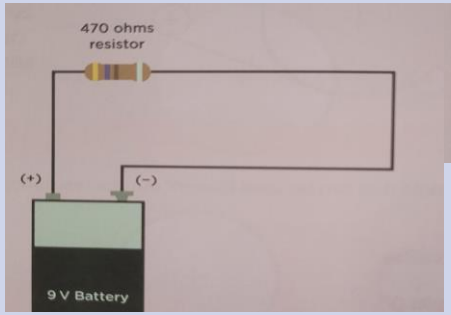
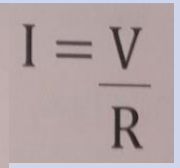
Components are often attached to a **Printed Circuit Board (PCB)** which is made from Epoxy resin, a thermosetting polymer which is a good electrical insulator.

Key words:
Voltage: the power supply of the circuit, the push (e.g 9 volt battery)
Current: The amount of electricity flowing around the circuit
Resistance: How the current is slowed down by econdountering things in the way e.g, wires and components.

Calculations: OHM's law

Voltage (V)= current x resistance
Current (I) = voltage / resistance
Resistance (R) = voltage / Current

Units of measurement:
Voltage = volts (V)
Current = amps (A)
Resistance =ohms (Ω)

Vocabulary	Wider Research	Apply
Connections **LEDS** **Resistors** **Fuses** **Power Supplies** **Voltage** **Resistance** **Current** **Motor** **Relay** **Soldering** **Piezo Sounder** **Capacitor** **Supply**	https://technologystudent.com/elec1/elecex.htm https://www.bbc.co.uk/bitesize/guides/zn2w7p3/revision/9 https://www.bbc.co.uk/bitesize/guides/zcxmfcw/revision/1 https://www.bbc.co.uk/bitesize/guides/zk37hyc/revision/1 https://learning-center.homesciencetools.com/article/ https://www.slideshare.net/electronics/ https://www.youtube.com/watch?v=j0zf-otH3cY 	1. Complete the table below, by giving the correct classification for **each** named material used in the manufacturing of the climbing wall. 3 × [1] Note: The first material has been completed. | Material	Classification
---	---
Mild steel	Ferrous
Acrylic	.....
Polyester resin	.....
Aluminium	.....	 2. The climbing walls are assembled using nuts and bolts. Explain, using **notes and diagrams**, how you would cut an external M8 thread on an 8mm diameter mild steel bar. [6] 3. Here is a simple circuit that has a 9 volt battery and a 470 ohm resistor. Use Ohms law to calculate the current.   4. Left is a simple circuit diagram. What is the current (I) value? 5. What is the role of a resistor? 6.How has the use of surface mount technology changed electronic products? 5. Label these circuit components.