

- Diamond
- Graphite
- Sodium chloride
- Water
- Methane
- Copper
- Carbon dioxide
- Carbon monoxide

8. Chemical bonds in graphite and diamond. Complete the text with the adjectives and nouns from the box.

- adjacent
- parallel
- abrasive
- perpendicular
- laminar
- planar
- tetrahedron
- parallel

In graphite the carbon atoms are arranged in 1 parallel sheets, and each atom has only three near neighbours. The covalent bonds between 2 adjacent carbons within each layer are quite strong and are called σ bonds. The fourth valence electron in carbon has its orbital 3 perpendicular to the plane. This orbital bonds weakly with the similar orbitals on all three neighbours, forming π bonds. The four bonds for each carbon atom in the graphite structure are not arranged in a 4 tetrahedron, they are in a plane. The 5 planar arrangement results in strong bonding, although not as strong as the bonding in the diamond configuration. The bonding between layers is quite weak and arises from the van der Waals interaction; there is much slippage parallel to the layers. Diamond and graphite form an interesting contrast: diamond is the hardest material in nature and is used as a 6 abrasive while graphite is used as a 7 lubricant

Pronounce the words correctly:
 electronegativity chlorine loosely ions cation anion partial charges dissolve sphere

6. Covalent bond: Read the text and suggest a word for each gap, then listen and compare.

A covalent bond results when two atoms s _____ electrons. In the case of two hydrogen atoms, each shares its single electron with the other. This sharing allows each to fill its electron s _____ with two electrons. The pair of shared electrons constitutes a covalent s _____ bond.

Let's now consider oxygen, an atom with eight electrons. Two electrons fill the l _____ shell, and the other six electrons reside in the next shell. This outer shell needs two more electrons to c _____ it (the octet rule). Two oxygen atoms form a covalent d _____ bond by sharing two electron pairs from their outer shells.

Carbon is perhaps the most versatile element on Earth, in large part because it contains only four electrons in a shell that can h _____ eight. To fill its outer shell, carbon forms four covalent bonds with up to four other atoms.

In a molecule of m _____ carbon shares electrons with hydrogen atoms, forming four covalent single bonds. Although this molecule is relatively simple, carbon often forms the d _____ of large, complex molecules. With each carbon atom able to bond to four other atoms, carbon-based m _____ are incredibly diverse.

Triple bonds are rare, but nitrogen gas molecules (the most a _____ molecule in the air we breathe) form triple bonds. The two nitrogen atoms share three pairs of electrons, allowing each to have eight electrons in its o _____ electron shell.

Kulabon for (1) Working in a lab
 (2) " " on animals
 (3) " " with chemicals
 (4) doing homework + taking tests
 (5) working with humans in bodies

3. Complete the gaps and practise reading the equations.

decomposes into combine to produce to react with yield



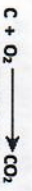
Two molecules of hydrogen peroxide go to form one molecule of oxygen gas plus two molecules of water.



Methane and oxygen carbon dioxide and water.



Two atoms of carbon plus one molecule of oxygen two molecules of carbon monoxide.



Carbon reacts with oxygen to form carbon dioxide.



It takes 2 molecules of sodium hydroxide 1 molecule of sulphuric acid to produce 1 molecule of sodium sulphate and 2 molecules of water.



Water can break down into hydrogen and hydroxide ions, but hydrogen and hydroxide ions can also combine back together to form water.



2 molecules of H_2O_2 decompose to form 2 molecules of H_2O plus one molecule of oxygen gas.
 OR: Hydrogen peroxide water and oxygen gas.

4. Types of reactions – suggest the words:

1. A complex molecule breaks down to form simpler ones.

D decomposition

2. Reaction between an acid and base which yields a salt and water.

N neutralization

3. One reactive element is replaced by another element in a compound formula.

DIS placement

4. Molecules of two reactants exchange some atoms or groups of atoms and give two new compounds; rearrangement takes place.

CON version

5. Two or more reactants combine to form one product.

S ynthesis

6. Reaction of a compound or element with oxygen to form an oxide and produce heat.

COM bus-tion

5. Read these equations and identify the type of reaction according to ex.2.



[Zadjeje text.]
 Check on google



23 Complete the sentences with the verbs in brackets in the infinitive (with or without to) or the gerund

- I learned to speak French when I was at school. (speak)
- Do you fancy _____ a film tonight? (see)
- Laura's mother doesn't let her _____ when she wants. (go out)
- I can't afford _____ a holiday this year. (have)
- It's getting late. We'd better _____ much longer. (not stay)
- I'm going to carry on _____ until 8.00 tonight. (work)
- What are you planning _____ to the party? (wear)
- Would you rather _____ in the country or in a town? (live)
- I couldn't help _____ when my brother fell off his bicycle. (laugh)
- Did you manage _____ all the homework I gave you? (finish)
- We're really looking forward to _____ you again. (see)
- If I tell you, do you promise _____ anybody? (not tell)
- My boss made me _____ late last night. (work)
- Since I've moved abroad I really miss _____ my friends. (not see)
- Would you like me _____ you with the dinner? (help)
- I don't mind _____. I'm not in a hurry. (wait)
- You're not allowed _____ here. (park)
- You need to practise _____ if you want to pass your English exam. (speak)
- I like _____ early in the morning in the summer. (get up)
- Monica might _____ tomorrow. She's ill. (not come)
- I enjoy _____ time with my grandparents. (spend)
- Will you be able _____ me a lift to work tomorrow? (give)

check your work

24 Complete the sentences with the verbs in brackets in the gerund or the infinitive with to.

- You forgot to buy the milk. (buy)
- Could you try _____ late tomorrow? (not be)
- The sheets on this bed are dirty. They need _____. (change)
- Don't you remember _____ his wife at that party at Christmas? (meet)
- I'll never forget _____ in New York for the first time. (arrive)
- I think you need _____ the irregular verbs. (revise)
- Did you remember _____ James about the meeting tomorrow? (tell)
- If the computer doesn't work, try _____ it off and switching it on again. (turn)

25-30 Excellent You can use gerunds and infinitives very well.
 16-24 Quite good, but check the rules in the Grammar Bank (Student's Book p.140) for any questions that you got wrong.
 0-15 This is difficult for you. Read the rules in the Grammar Bank again (Student's Book p.140). Then ask your teacher for another photocopy and do the exercise again at home.



25 Complete the verb column with the correct form of the verbs in brackets.

26 Ask your partner the questions in a.

- Do you remember _____ your best friend for the first time? (meet)
- Did your parents let you _____ in the street when you were young? (play)
- What kind of things do you tend _____ about? (worry)
- When did you learn _____? (drive)
- What's the next thing you really need _____? (buy)
- Have you ever tried _____ a winter sport, e.g. skiing or ice skating? (do)
- Would you avoid _____ to a party if you knew your ex-partner was going? (go)
- Would you ever risk _____ and leaving your front door unlocked? (go out)
- Have you ever forgotten _____ something important for a holiday? (pack)
- If you didn't want to go to school/work one day, would you pretend _____ ill? (be)
- Would you agree _____ a friend's dog for the weekend? (look after)
- Can you imagine _____ speak English totally fluently? (be able to)

VERB

FOLD

27 Complete the verb column with the correct form of the verbs in brackets.

28 Ask your partner the questions in a.

- Are there any programmes you really can't stand _____ on TV? (watch)
- Do you always remember _____ your mobile phone? (charge)
- Do you think you'll carry on _____ English here next year? (study)
- What is there that you would really like to have but can't afford _____? (buy)
- Would you rather _____ a film at the cinema or on DVD? (see)
- Who taught you _____? (swim)
- Is there anything at your home which needs _____? (repair)
- Have you ever tried _____ something but then given up? (learn)
- Would you or your family manage _____ without a car? (live)
- What can you do to practise _____ English outside the class? (speak)
- Do you sometimes forget _____ things or have you got a good memory? (do)
- Could you give up _____ chocolate if your doctor told you to? (eat)

VERB

FOLD

Language development 1

Permission and necessity: present

1 a Look at these comments made in a restaurant. Which ones are more likely to be made by a waiter, and which ones by a customer?

1 We're not allowed to smoke, are we?

2 You don't have to give them a tip.

3 I'm afraid you can't sit there - it's reserved.

4 You're allowed to smoke in this area.

5 Excuse me, sir, children over 12 mustn't use the play area.

6 Steve, you're not supposed to use your mobile phone here. Turn it off.

7 I'm sorry, but you have to wear a tie to eat here.

8 I must try one of the desserts - they look delicious.

9 You can choose any table on this side, madam.

10 I think we are supposed to leave a tip.



b Write the words and phrases in *italics* 1-10 in the correct place in the table below.

Function	Example
A Giving permission	1 2
B Prohibiting	1 2 3 4
C Expressing obligation	1 2 3 4
D Expressing lack of necessity	1 2 3 4

2 a Grammar reference pages 300-201 Complete the sentences with the correct form of the words in brackets. You may need to make the verb negative.

- 1 They're very busy at the weekend, so we *(must/book)* a table.
- 2 It's a formal dinner. You *(can/wear)* jeans.
- 3 Lorna's a club member. Of course she *(allow/come)* in!
- 4 I think we *(suppose/wait)* for a waiter to show us to our table.
- 5 You *(have to/leave)* a starter if you don't want one.
- 6 You *(must/bring)* your own food or drink to this restaurant!
- 7 Children under 16 *(allow/drink)* alcohol; they're too young.
- 8 You *(can/pay)* by cash, cheque or credit card.

check on google

Permission and necessity: past

3 a Read the extract from a letter about a new restaurant and answer the questions.

- 1 Was it necessary to wear a suit?
- 2 What was the worst thing about the restaurant?

We went to that new restaurant yesterday. It's very big, so we didn't have to book a table. John wore a suit because he thought it would be very formal, but in fact it wasn't. So he didn't have to dress so smartly. Of course, the children couldn't pay in the restaurant but they were allowed to use the play area outside. The meal was very expensive though - we had to pay by credit card because we didn't have enough money with us. And what of all that wasn't allowed to smoke!

b Complete the table with examples from the letter.

Meaning	Example
It was permitted.	1
It was prohibited.	2
It was necessary.
It wasn't necessary.
It was done but it wasn't necessary.

c Grammar reference pages 190-191

a Mark the correct forms in each pair.

When I was a student I worked as a waiter during the holidays. The best thing was that I *(a) needn't have paid / didn't have to pay* for my meals, as they were all free. We *(2) were allowed to / had to eat* as much as we wanted during breaks, but the work was tiring because we *(3) could / had to work* long hours. And although customers *(4) had to / could give* us tips, we *(5) couldn't have kept / couldn't keep* the money - we *(6) had to / were allowed to* share it with the other staff. I was nervous when I started because they said that sometimes I would *(7) need to have cooked / have to cook* the food, but I *(8) couldn't worry / needn't have worried* because I *(9) was allowed to / didn't have to cook* at all while I worked there.

b What rules about food and eating did your family have when you were a child?

Advice and recommendation

5 Find and correct the mistakes in these sentences.

- 1 You ought complain about that soup - it's cold.
- 2 You shouldn't having a dessert if you're full up.
- 3 If you don't like pasta, you'd better to have a pizza.
- 4 You must have try that new restaurant in Castle Street.

c Grammar reference page 191

6 Replace the words in *italics* in the letter below with words from the list in the correct form.

can must have to had better

Dear Melanie,
Thanks for agreeing to look after our house while we're away. Just a few things to remember:
Be careful with the front door lock. It's *necessary* to (1) pull it up before turning it. But it's *very important* not to (2) force the key or it'll break!
Please feed the cat twice a day. You are *allowed* to (3) give him anything from the bottom shelf.
It's *not necessary* for you to (4) pay us to use the phone, and the kids are *permitted* to (5) use the PlayStation. We *strongly recommend* you (6) try the local restaurant. It's a *good idea* to (7) book though.

Have fun,
Louise

7 Complete these sentences about yourself.

- 1 This year I really must ... but I mustn't ...
- 2 At college / work we have to ... but we don't have to ...
- 3 When I was younger I could ... but I wasn't allowed to ... I had to ... but I didn't have to ...

5. Transform the sentences below.

- Now that you have heated the substance, you can see that it softens. (3 words)
Now that the substance, you can see that it softens.
- It is important that the report is finished today. (2 words)
The report finished today.
- If you don't keep test tubes and burets on their racks, they might tip over or roll away. (3 words)
Unless..... on their racks, tubes and burets might tip over or roll away.
- In the second year at the university you can decide which two subjects you will attend.
In the second year at the university you are free two options. (2 words)
- I advise you to check the number of significant figures you started and ended with.
You check the number of significant figures you started and ended with. (1 word)

6. Write a new sentence so that it has a similar meaning to the original sentence, using the given words.

- Maybe we will look at the fluorescence properties of organic material.
We at the fluorescence properties of organic material. (2 word)
- Soft materials are easily scratched.
It is soft materials. (3 words)
- Exothermic reactions tend to be more probable than endothermic ones.
Exothermic reactions are happen than endothermic ones. (3 words)
- Our team was required to submit the report in extremely short time but we didn't mind.
We didn't mind our report in extremely short time. (1 word)

4
do +

27 'Well done for scoring twice, Mark,' said the coach.

PRAISED

Mark for scoring twice.

28 You are welcome to contact me if you need more information.

TOUCH

Please feel free me if you need more information.

29 Tickets for the concert cannot be bought before 12th May.

SALE

Tickets for the concert will not 12th May.

30 I didn't buy the camera because it was so expensive.

BEEN

I would have bought the camera so expensive.

① active/passive

⑥ fixed phrases

② modals

⑦ changing tenses

③ ing vs to

⑧ conditionals

④ using synonyms

⑨ reported speech reporting verbs /

⑤ positive vs negative context

⑩ singular to plural

① Context: a) is it noun, verb, adj, adv, etc.
b) pos vs neg context c) singular or plural context

Which one?

5. Use the word given in brackets in capital letters to form a word that fits in the gap. Do not use -ing or -ed forms.

- makes the immune system act to protect the body against the foreign material. (VACCINE)
- In polar covalent bonds, electrons are shared (EQUALITY)
- We can observe electrical between positively and negatively charged ions. (ATTRACT)
- Sulphur dioxide is used in food (PRESERVE)
- A reaction may reach equilibrium in which the rates of forward and reverse reactions are equal. (REVERSE)
- In the process of, a complex molecule breaks down to form simpler ones. (COMPOSE)
- substances may explode if exposed to fire or heat. (EXPLODE)
- materials are easy to draw into thin wire. (DUCTILITY)

- The zone of the seashore between high- and low-water marks, or the zone near a lake shore with rooted vegetation –
- The region of the earth between the Tropic of Cancer and the Arctic Circle, and between the Tropic of Capricorn and the Antarctic Circle –
- The region of the earth that surrounds the equator, from 23.5 degrees north to 23.5 degrees south –
- An area where a freshwater river meets the ocean, resulting in fluctuations in salinity –
- Any water in a sea that is neither close to the bottom nor near the shore –

tundra, coniferous forest, deciduous forest, pelagic, desert, mountains, estuarine, reef, littoral, savannah, swamp, rainforest, coastal, tropical, lakes and ponds, sea bed, temperate, urban, farmland, wildflower meadow, taiga, grassland, marsh, parkland, rivers and streams

6. Which habitats are shown in the pictures?



<http://www.bbc.co.uk/nature/habitats>

7. Now classify all these habitats into following three categories:

TERRESTRIAL HABITATS	FRESHWATER HABITATS	MARINE HABITATS

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1. Discuss:

- How important are plants for humans?
- Some plants are under threat. What is the reason?

2. Listen to a talk about one project run to save plants, and complete the table below.

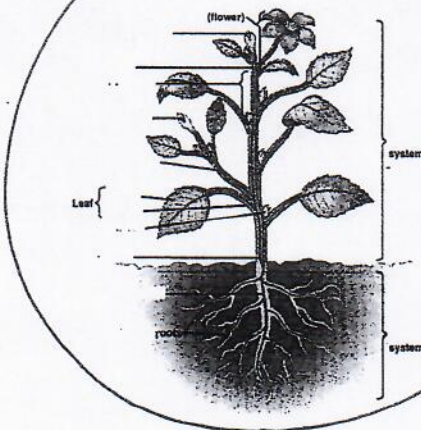
1	the way of saving plants	
2	species most under threat	
3	no of countries in the project	
4	no of cooperating institutions in the project	
5	the temperature at which the seeds are stored	
6	the time for which these seeds are undoubtedly capable of germinating	
7	collected plants seeds in the world-wide scale	
8	the country running a similar project	
9	the area in the USA under restoration	
10	average cost of training	per

3. Look at the definitions of phrases describing anatomic parts of a plant and label the picture.

root system	the part of a plant in the ground
shoot system	the part of a plant above the ground
stem	main part of a plant from which leaves and flowers grow
lateral root	extend horizontally from the primary root
taproot	main part of a plant through which water and minerals are absorbed, usually in the ground
reproductive shoot	a shoot bearing a flower
vegetative shoot	a shoot not specialized for reproduction
node	a part of a stem that normally bears a leaf
internode	section between two nodes
axillary bud	growing from the place where a leaf/shoot is connected to a stem
terminal bud	bud ending a shoot
blade	flat part of a leaf
petiole	connects the flat part of a leaf with the main part of a plant

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Plant Anatomy (FPEG obrázek 491 + 000 bodů) <http://tr.gilred.facstaff.pbworks.com/#1302558549/Plant>



4. Categorize adverbs of frequency below into words/phrases to

- start process description:
- refer to preceding actions:
- refer to simultaneous actions:

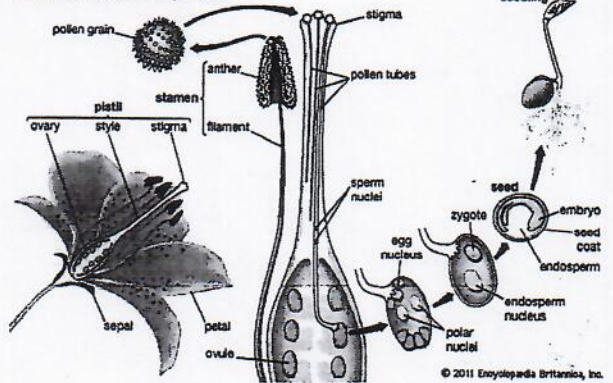
first, at this point, initially, first of all, then, simultaneously, before..., next, later, afterwards, after that, after..., at the next stage, finally, before that, when, eventually, in the end, at the end of..., subsequently, meanwhile, at the same time, prior to..., following that

5. Complete the text about the plant life cycle with suitable adverbs of sequence from ex. 3 and 4 (try to use a different adverb each time).

Like all living things, plants too have a life cycle. The flowering plant life cycle begins with a seed. _____ the seed is sown. _____ some time it will germinate and a tiny, immature plant called a seedling will grow. The tiny roots will work their way down, and _____ the tiny stem will work its way up. With sunlight and water, this seedling will grow larger and more mature. The stem and root will grow longer, and new leaves will appear on the plant. _____ roots and leaves develop, buds will form and, _____ the plant will start flowering. _____ the flower is pollinated. Once fertilized, the flowers will begin developing seeds. Some plants protect the seeds inside the fruit that houses the seeds until they are ready. _____ the fruit is ripe, the plant will use all kinds of techniques to let the seeds disperse. For some plants, this means dropping fruit onto the ground to

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How flowering plants reproduce



11. Grammar revision: look at the sentences from ex. 6.

-What time do underlined parts refer to?

With sunlight and water, this seedling will grow larger and more mature.

Before roots and leaves develop, buds will form.

-Can we say these sentences with "going to" or present continuous for future references?

-Give examples of sentences with these two structures to show the difference in meaning.

Now carry on with the activities from the grammar handout.

Sources:

- Macmillan Vocabulary Practice Series – Science CD-ROM
- www.kw.org/discover/videos/beyond-gardens-millennium-seed-bank-partnership, seen November 22, 2015
- <http://scienceline.com> (adapted), visited July 5, 2017
- https://www.youtube.com/watch?v=ErFks5aI_Q&t=8s (adapted), visited July 5, 2017
- <http://w3.dvm.ku.edu.tw/bio/activelearner>
- <http://en.wikipedia.org>
- http://pbschool.com/science/biology_place/biocoach/photosynth/intro.html
- <http://dictionary.reference.com>

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Kingdoms

The first division of living things in the classification system is to put them into one of five kingdoms. The five kingdoms are:

- animals (all multicellular animals)
- plants (all green plants)
- fungi (moulds, mushrooms, yeast)
- protists (*amoeba*, *chlorella* and *plasmodium*)
- prokaryotes (bacteria, blue-green algae)



Further divisions

Living things can then be ranked according to:

- phylum**
- class
- order
- family
- genus**
- species**

Phylum follows Kingdom and has many different organisms, including three examples from the Animal Kingdom below:

- chordata, which have backbones
- arthropod, which have jointed legs and an exoskeleton
- annelids, which are segmented worms

Class is an additional sub-division, which for example, results in the Chordata phylum being divided into:

- mammals
- birds
- amphibians
- fish
- reptiles

Order follows class and as an example, mammals can be further sub-divided into a variety of different groups such as:

- carnivores
- primates

<https://www.bbc.co.uk/bitesize/guides/zs9ydzs/revision/8>

2/6

CLASSIFYING – ANIMALS, Intro to presentations

Now classify the items into these four categories (use classifying language):

SOCIAL BEHAVIOUR	LOCOMOTION	ACTIVITY PATTERN	FOOD HABITS

12. In groups of five, choose an animal and present it to the rest of the class (in 5 minutes). Give information on its:

- Taxonomy: class and species (use English, not Latin terms, where possible)
- geographical range, habitat
- conservation status
- lifespan, behaviour: activity pattern, locomotion, social behaviour, food habits
- reproduction: techniques, no of offspring, parental investment

When presenting, remember to speak loudly, clearly, TO the audience, and to use vocabulary which you understand well, your audience is able to understand, or which you are able to explain well.

Remember to have an introductory sentence in the beginning:

Let us introduce/present a ... to you. *What you can see in the picture is ...*
 We would like to present a ... to you today. *... are very interesting/ specific/ etc. animals.*
 What we would like to talk about today is ...

And a final statement in the end:

This is all about ..., we hope you have enjoyed it.
And that's the end of our presentation, thank you for your attention.
To end our presentation, we want to thank you for listening, and hope you found it interesting and informative.

Be ready to give feedback to other presentations as far as their CONTENT, ORGANISATION, PRESENTATION SKILLS/ DELIVERY, LANGUAGE

CLASSIFYING – ANIMALS, Intro to presentations

8. Which of the habitats do the following animals live in?

koala - sloth- clams-

9. All the words below relate to animal reproduction techniques. Organize the words in a diagram, classifying animals according to this criterion.

oviparous	viviparous	ovoviviparous	marsupials	placental	sexual
hermaphroditism	asexual	external fertilization	internal fertilization		



10. Which category do the animals from 8. fall into?

11. Behaviour. Match definitions below with their terms

Terms: territorial, scansorial, omnivore, cursorial, herbivore, carnivore, saltatorial, folivore, natatorial, diurnal, frugivore, granivore, nocturnal, crepuscular, hibernating, solitary, colonial

Definitions:

- adapted for leaping
- specialized for swimming
- eating plants
- eating everything
- active in the daytime
- capable of climbing
- living in big groups
- active in the night-time
- feeding on leaves
- active in twilight
- feeding on grains
- feeding on meat
- in a dormant state in winter
- capable of running
- living alone or in pairs
- eating fruits
- defending certain territory

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CLASSIFYING – ANIMALS, Intro to presentations

GRAMMAR REVISION: ADJECTIVES

Look at different ways of forming adjectives in English. Write a few examples appearing in today's lesson into each category.

adjective endings				
-ed	-ing	-ous	-able	-al

Now choose one word from each category and make a sentence with it.

- 1.
- 2.
- 3.
- 4.
- 5.

HOMEWORK:

Do activities on adjectives from the two grammar handouts (so vs such and adjectives/nouns – word formation)

Sources:

- Ex.1-3: Wharton, Jennifer (2009) *Academic Encounters, the Natural World*; CUP <http://www.bbc.co.uk/nature/habitats>
- handout: Mammals by Hana Němcová, based on: <http://animaldiversity.ummz.umich.edu/site/accounts/Information/Mammalia.html> <http://www.britannica.com/> <http://www.wikipedia.com> <http://www.youtube.com> www.bbc.co.uk <http://www.oxforddictionaries.com/>