

SECTION 3

ALCOHOL AND ITS EFFECTS (PHYSICAL AND SOCIAL)

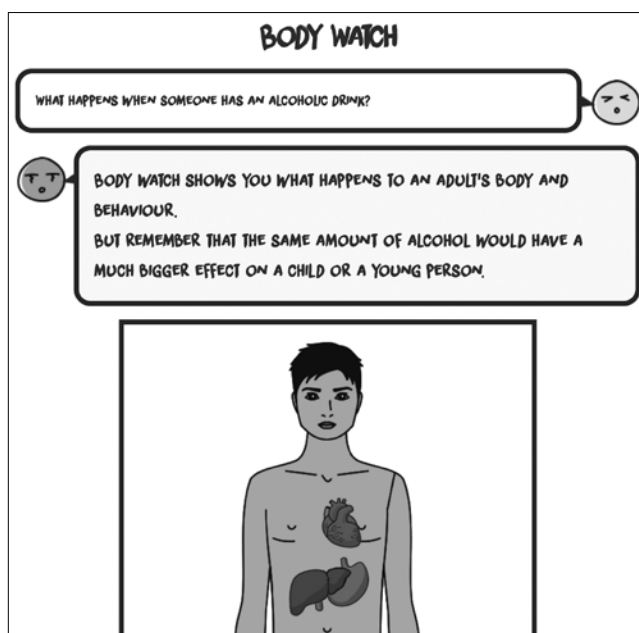
In this section you will find a blank worksheet for students to fill in their ideas about alcohol's effect on different parts of the body, plus the answer sheet for you to work through with them.

If you have internet access/netbooks, there is an interactive body that pupils can scroll over and find out the answers in the [body zone](http://talkaboutalcohol.com) of our Online Learning Zone, talkaboutalcohol.com

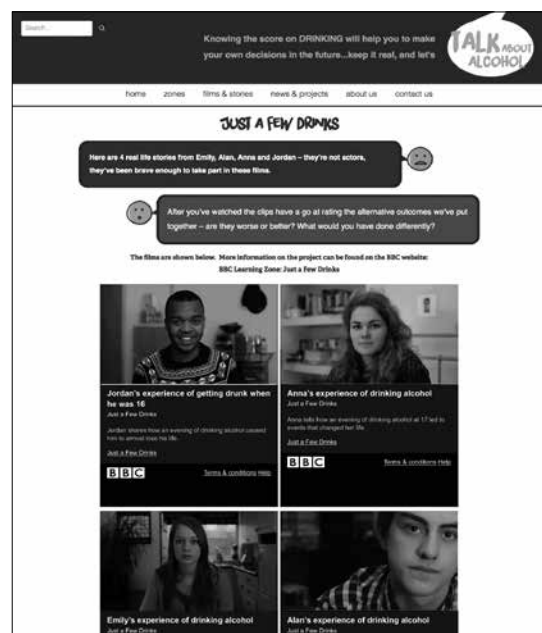
You will also find lesson plans on:

- o The short term effects of alcohol on the body
- o What happens to alcohol in the body
- o The long term effects of alcohol in the body
- o You, your friends and strangers
- o A series of lesson plans built around BBC films 'Just a few drinks'
- o Alcohol and the community
- o Responsible drinking
- o Investigating the dehydrating effects of alcohol (11 - 14)
- o Investigating the dehydrating effects of alcohol (14 - 16).

You may wish to use some of the film clips on the Alcohol Education Trust website. As well as the four 'Just A few drinks' BBC films (bbc.co.uk/education/topics/z8w7pv4/resources/1). We also suggest that you use the UK government public information films about binge drinking 'You wouldn't start an evening like this' (there are 2 versions, one featuring a boy and the other a girl). These are all available at alcoholeducationtrust.org/teacher-area/effects-physical-and-social/.



Interactive Body on talkaboutalcohol.com



Just a Few Drinks activity on talkaboutalcohol.com

Brain

Head

Heart

Liver

Waist


Skin

Eyes

Gut

Reproductive organs

Arms/plts



Further information is available on the interactive body at talkaboutalcohol.com/interactive-body/

Skin

Too much alcohol dehydrates the body, which is bad news for the skin and complexion. It also dilates the blood vessels under the surface of the skin, leading to ugly veins on the nose and cheeks.

Eyes

Too much alcohol dilates blood vessels in the eyes, so they can look red and bloodshot. It also affects the signals sent from the eyes to the brain - vision becomes blurred, and distances and speeds get harder to judge. Many road accidents involve drivers or pedestrians who have alcohol in their blood. Too much alcohol also suppresses REM (Rapid Eye Movement) sleep. It's the most important phase of sleep so drinking heavily can ruin the chance of a good night's rest.

Gut

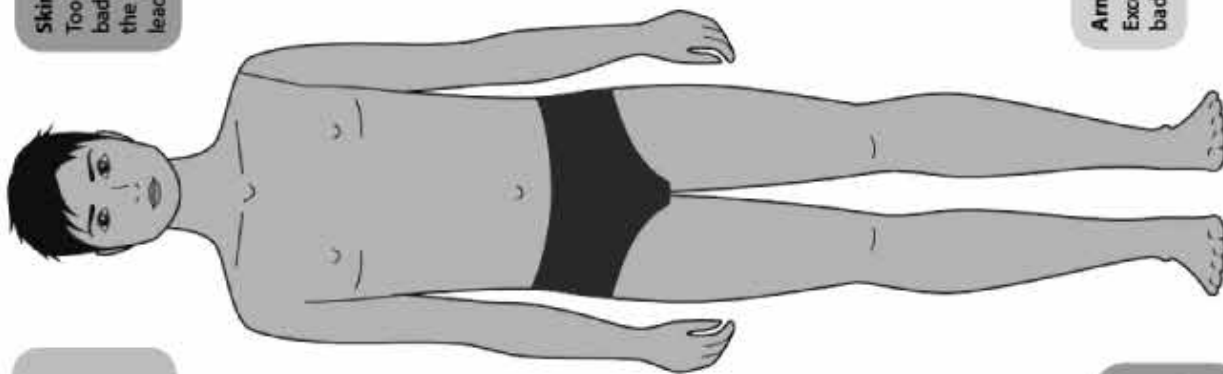
Alcohol is absorbed from the stomach into the bloodstream. Your body's ability to process alcohol depends on various things, like your age, weight and sex. Your body breaks down alcohol at a rate of roughly one unit per hour. Because it takes time for your body to break down alcohol, drinking more than one unit of alcohol an hour will build up your blood alcohol concentration (BAC) and it may be many hours before you are safe to drive. After a night of heavy drinking you risk being over the drink drive limit the next morning. Learn more at www.morning-after.org.uk

Reproductive organs

Drinking too much alcohol can affect performance in the bedroom because the drinker's not fully in control of their body. Alcohol affects judgement too, so people may have unsafe sex or sex they later regret. In women, heavy drinking may delay periods and affect fertility. As alcohol crosses the placenta to the baby, you should not drink if you are pregnant.

Armpits

Excess alcohol is also excreted as smelly body odour and bad breath - not great for attracting potential partners.

**Brain**

Too much alcohol acts a depressant on the brain, the control centre of the body. It can make the drinker feel happy for a little while, but that's followed by a depressing low. Long-term drinking can kill off brain cells and lead to memory loss and mental problems.

Head

After a few drinks, it can be easy for someone to lose their head. They may feel more relaxed, emotional and uninhibited, but they also lose control. Their judgement is affected too. They might make a fool of themselves, get into trouble, cause an accident or do something they regret later. Every year, 18-22% of accidental deaths are alcohol related. Alcohol draws water out of the brain. So, as the body starts to break down alcohol, the drinker may feel dizzy and be in for a throbbing headache if they drink too much.

Heart

Drinking large quantities of alcohol over a short period can cause irregular heart beats and shortness of breath, leading to panic attacks and illness. Moderate drinking, that is 1 or 2 units a day, may offer some protection from heart disease in men over 40 and in post menopausal women, but it is not advised that an adult takes up drinking if they don't already. It is more important to be physically active, eat a healthy, balanced diet and to avoid smoking.

Liver

The liver breaks down most of the alcohol a person drinks. (The rest leaves the body in breath, urine and sweat). But it can only break down about 1 unit (8g) of alcohol an hour in an average adult. More than that, and it stops working properly. If the body can't cope with all the alcohol in its system, the person falls into an alcoholic coma (which can be fatal). Long-term heavy drinking kills off liver cells, leading to a disease called cirrhosis. It's a 'silent' disease - symptoms may not be noticeable until the disease is advanced. Long-term excessive drinking can also lead to liver cancer.

Waist

Although alcohol is fat free, it is very calorific (only fat contains more calories per gram) and increases your appetite, so excess drinking can lead to weight gain.



Further information is available on the interactive body at talkaboutalcohol.com/interactive-body/

TEACHER NOTES**Short-term effects of alcohol on the body
(Science/environmental studies 11-16 worksheet 3)**

Target age group: 11 - 16 year-olds

Structure: 1 written lesson

ICT opportunity: Internet research

Preparation: Download/photocopy [The short term effects of alcohol on the body](#) sheet

Internet access to talkaboutalcohol.com/interactive-body/

Objectives

- o To show that the abuse of alcohol affects a person's health.
- o To show the short-term effects of alcohol on body functions.

Notes

Internet research could be done at home.

**What happens to alcohol in the body?
(Science/environmental studies 11 - 16 worksheet 2)**

Target age group: 11 - 16 year-olds

Structure: 1 written lesson

ICT opportunity: Internet research

Preparation: Download/photocopy [What happens to alcohol in the body](#) sheet (at least 1 between 2)

Internet access to talkaboutalcohol.com/interactive-body/

Objectives

- o To show what happens to alcohol when it enters the body.
- o To show how alcohol leaves the body.

Notes

Internet research could be done at home.

**Long-term effects of alcohol on the body
(Science/environmental studies 11 - 16 worksheet 6)**

Target age group: 11 - 16 year-olds

Structure: 1 written lesson

ICT opportunity: Internet research

Preparation: Download/photocopy [The long term effects of alcohol](#) sheet/[How too much alcohol affects the body](#) sheet

Internet access to talkaboutalcohol.com/interactive-body/

Objectives

- o To show that the abuse of alcohol affects a person's health.
- o To show the long-term effects of alcohol on body functions.

Notes

Internet research could be done at home.

**You, friends and strangers
(PSHE/PSD 11 - 14 worksheet 3)**

Target age group: 11 - 14 year-olds

Structure: 1 or 2 lessons depending on student ability

Preparation: Download/photocopy [You friends and strangers](#) sheet.

Objectives

- o To highlight the likely effects of alcohol on young people, physically and behaviourally.
- o To highlight the possible consequences of drinking.
- o To understand that drinking alcohol, especially too much, can easily have consequences for other people as well as the drinker.
- o To help young people consider their responsibility towards others.

N.B. A series of short 4 films, BBC2 Learning zone Just a few drinks film clips, can be used as part of Alcohol and it's effects teaching. See [pages 80-83](#).

Alcohol and the community (PSHE/PSD 14 - 16 worksheet 7)

Target age group: 14 - 16 year-olds

Structure: 1 to 3 lessons

Preparation: Download /photocopy [Alcohol and the community - What is the impact?](#) sheet.

Access to the Internet for research if possible.

Objectives

- o To consider the contribution of a product to a market economy from different angles, including the effects on individuals as well as the wider community.
- o To recognise the difference between social, 'sensible' drinking and excessive 'drinking to get drunk'.
- o To distinguish between fact and opinion
- o To form opinions through reasoned argument and debate.
- o To take an informed, objective viewpoint on what constitutes sensible drinking.

All tasks

Direct students to our Online Learning Zone talkaboutalcohol.com, especially the Fact Zone of the Young People's section.

Investigating the dehydrating effects of alcohol (Science/environmental studies 11 - 14 worksheet 4)

Target age group: 11 - 14 year-olds

Structure: 1 practical lesson (it could be more than one lesson if it is used as a basis for practical investigation).

Preparation: Download/photocopy [Investigating the dehydrating effects of alcohol on the body \(11 - 14\)](#) sheet (at least 1 between 2).

Objectives

- o To show the dehydrating effects of alcohol on living cells.
- o Introduction to practical investigation.

Investigating the dehydrating effects of alcohol (Science/environmental studies 14 - 16 worksheet 5)

Target age group: 14 - 16 year-olds

Structure: 1 practical lesson (it could be more than one lesson if it is used as a basis for practical investigation).

Preparation: Download/photocopy [Investigating the dehydrating effects of alcohol on the body \(14 - 16\)](#) sheet (at least 1 between 2).

Objectives

- o To show the dehydrating effects of alcohol on living cells.
- o Introduction to practical investigation.

SHORT-TERM EFFECTS OF ALCOHOL ON THE BODY

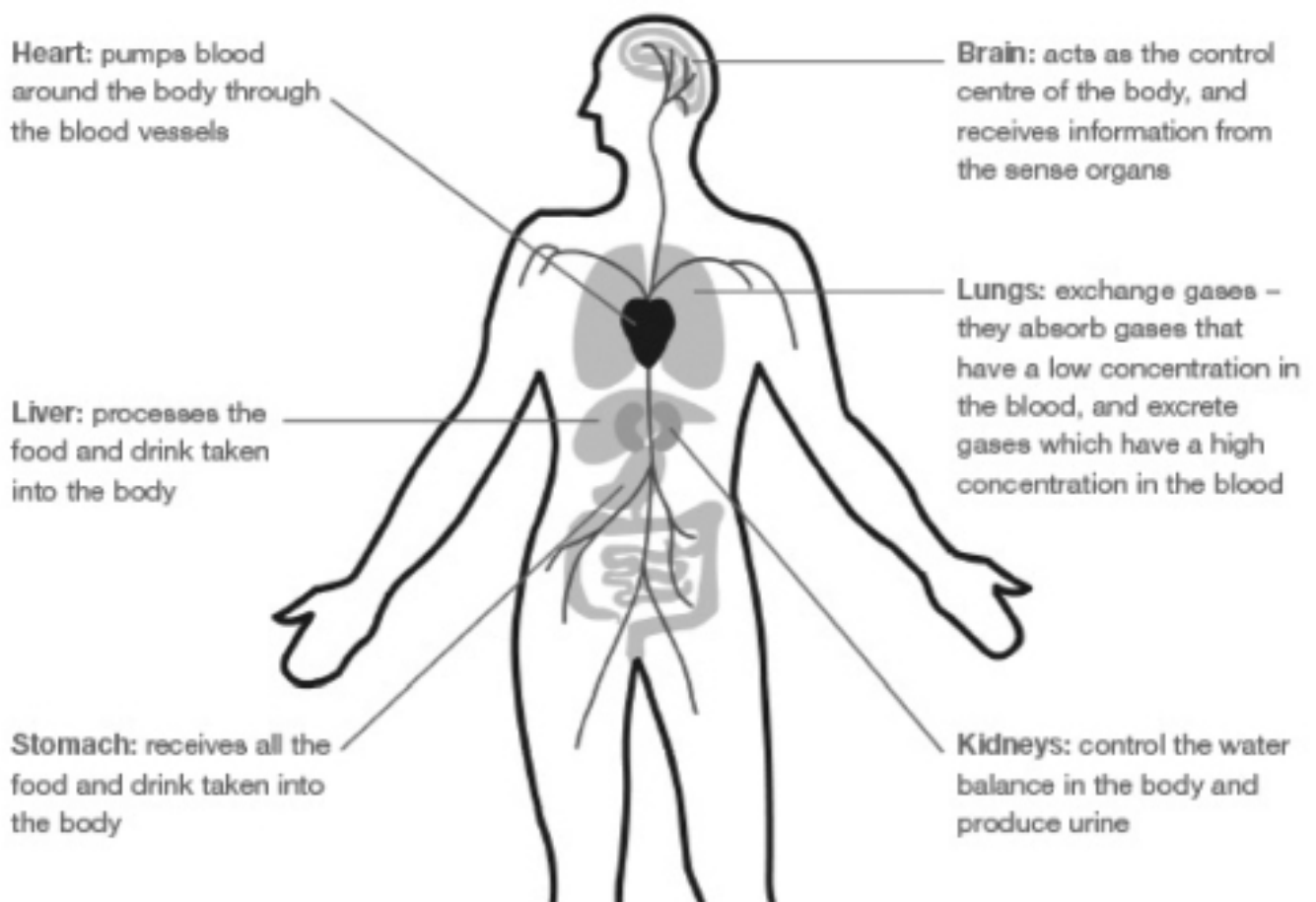
SCIENCE/ ENVIRONMENTAL STUDIES WORKSHEET 3

When alcohol is swallowed, how does it affect the body in the short term? The effect depends on the person - their gender, size and weight, what they've been drinking and whether they've eaten anything first.

Because it depends on weight and size, the person's age is important too. The same amount of alcohol will have a much greater effect on the body of a child or young person than on an adult, because their bodies are still growing and developing.

Activity one

Look at the diagram below.



Draw a line to connect the parts of the body (on page 2) with short term effects experienced after someone has drunk alcohol.

SHORT-TERM EFFECTS OF ALCOHOL ON THE BODY

SCIENCE/ ENVIRONMENTAL STUDIES WORKSHEET 3

Brain

Slurred speech

Kidneys

Difficulty standing up or walking

Liver

Looking flushed

Heart

Feeling sick

Lungs

Needing to urinate more (less anti-diuretic hormone secreted)

Stomach

Loss of self-control

Slow reactions

Dehydration leading to a 'hangover'

Blurred vision

Activity two

1. After drinking a lot of alcohol in the evening, can someone avoid a hangover by drinking a glass of water before they go to bed? Give reasons for your answer.
2. Can someone get rid of the effects of alcohol quickly by drinking a cup of coffee? Give reasons for your answer.
3. How would having a meal before alcohol affect the concentration of alcohol in someone's blood? Give reasons for your answer.
4. Why is cirrhosis of the liver called a 'silent disease'?

There is information to help you at talkaboutalcohol.com/interactive-body/

WHAT HAPPENS TO ALCOHOL IN THE BODY

SCIENCE/ ENVIRONMENTAL STUDIES WORKSHEET 2

How alcohol enters the body

When someone swallows alcohol, it travels to the stomach and small intestine. The alcohol is absorbed through the lining of the stomach and intestine and passes into the bloodstream. It circulates to other parts of the body including the brain.

How quickly the alcohol is absorbed, and how much goes into the blood, depends on a number of factors including:

- the amount and type of alcohol in the drink
- how quickly the person is drinking
- whether they have a full or empty stomach (food slows down the absorption of alcohol into the bloodstream)
- body size and weight (the same amount of alcohol will have a larger effect on a smaller person)
- male or female (alcohol is distributed around the body in water - the female body has more body fat and less water than the male body so alcohol concentrations tend to be higher in females).

The amount of alcohol in someone's blood is measured by their BAC (blood alcohol concentration). BAC is usually measured as the number of milligrams (mg) of alcohol in 100 millilitres (ml) of blood.

Most of the alcohol a person drinks is metabolised (broken down) by the liver. It can break down about 8g of alcohol an hour in an average adult - that's around 1 unit an hour. Because the liver is the main organ breaking down alcohol, it's also one of the first parts of the body to be harmed by heavy drinking. Long-term drinking kills off liver cells, leading to a disease called 'cirrhosis'. Long term excessive drinking can also lead to liver cancer.

How alcohol leaves the body

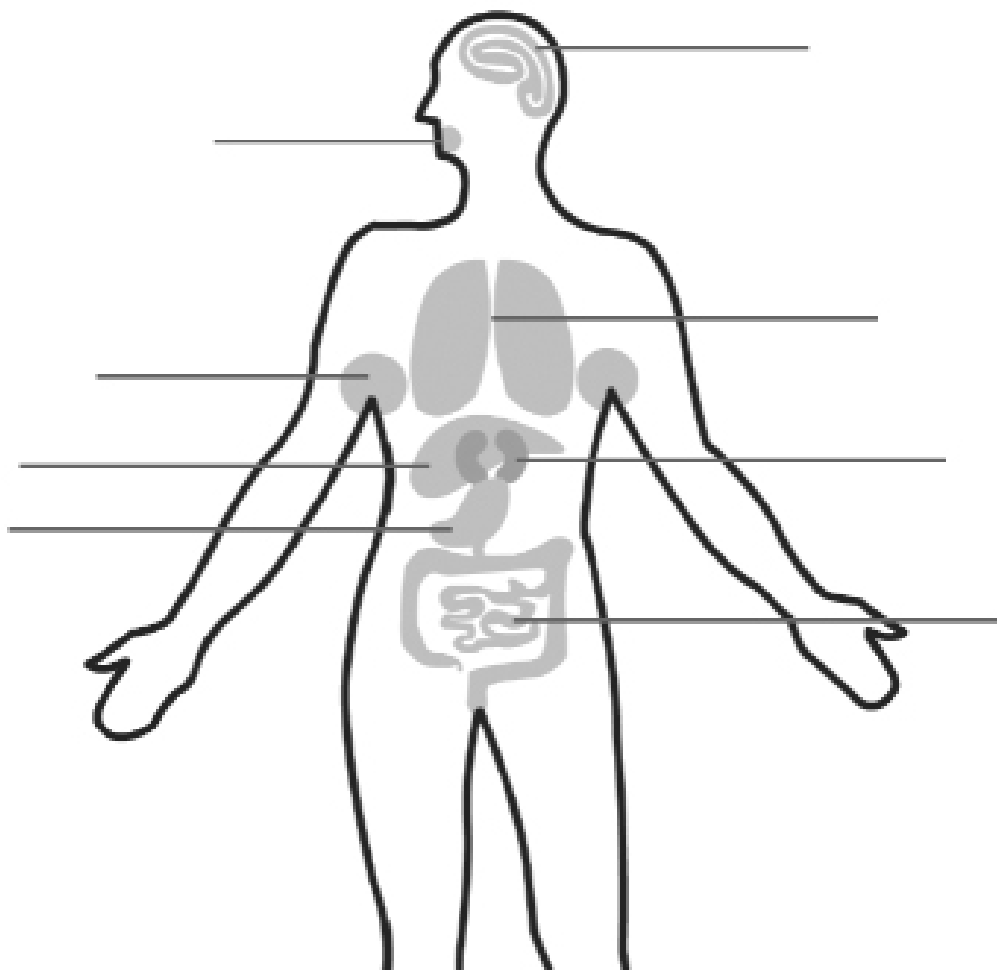
- Liver: about 90% of the alcohol is broken down by the liver
- Kidneys: 2-4% leaves the body in urine made by the kidneys
- Sweat glands: 2-6% leaves in perspiration from sweat glands
- Lungs: 2-4% is expired in the breath
- Mouth: 1-2% leaves in saliva

WHAT HAPPENS TO ALCOHOL IN THE BODY

SCIENCE/ ENVIRONMENTAL STUDIES WORKSHEET 2

ACTIVITY ONE

1. On the diagram of the adult human body, add a label to the two areas of the body from which alcohol is absorbed after swallowing. The lines from each area have already been added for you.
2. Alcohol is carried in the bloodstream to the main organs of the body. Label the organ which is affected by alcohol leading to blurry vision and lack of coordination.
3. Label the organ which metabolises most of the alcohol in the body.
4. Around 2-4% of alcohol leaves the body in urine. Label the organs which make urine.
5. A small percentage of alcohol also leaves the body in sweat, breath and saliva. Label the three areas of the body involved.



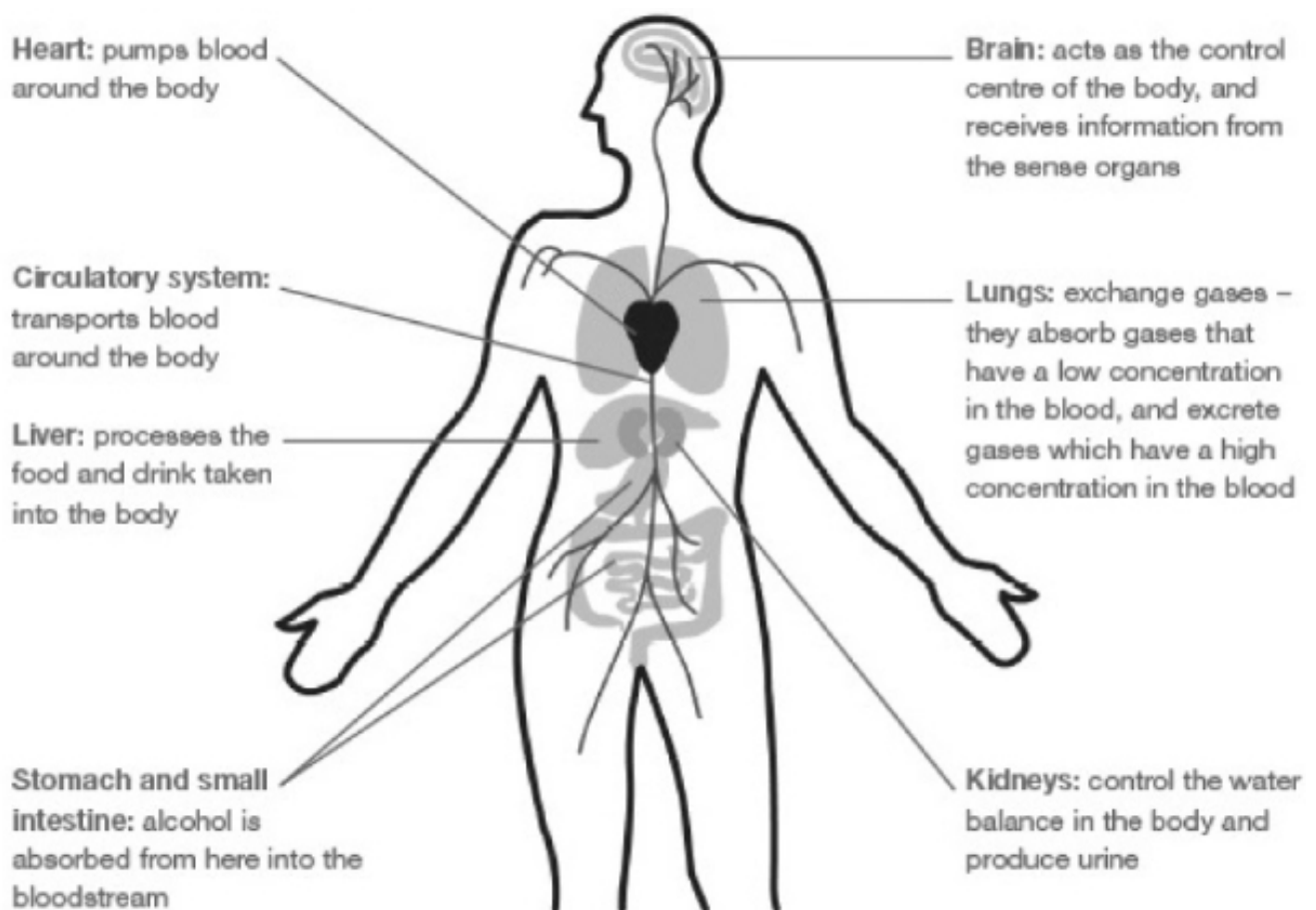
LONG TERM EFFECTS OF ALCOHOL ON THE BODY

SCIENCE/ ENVIRONMENTAL STUDIES WORKSHEET 6

Drinking alcohol has short term effects on the body (Worksheet 3). However, drinking excessive alcohol over a longer period of time can have serious effects on a person's health.

ACTIVITY ONE

Look at the diagram below:



LONG TERM EFFECTS OF ALCOHOL ON THE BODY

SCIENCE/ ENVIRONMENTAL STUDIES WORKSHEET 6

Draw a line to connect the parts of the body with the long-term effects of alcohol.

| | |
|------------------------------------|----------------------------|
| Brain | Cirrhosis and cancer |
| Liver | Ulcers |
| Heart | Depression and mood swings |
| Circulatory system | Urinary infections |
| Lungs | Memory loss |
| Stomach and small intestine | Bloodshot eyes |
| Kidneys | High blood pressure |
| | Mental illness |
| | Flushed complexion |
| | Rapid pulse |
| | Vomiting and diarrhoea |
| | Dehydration |

There is information to help you at talkaboutalcohol.com/interactive-body/

ACTIVITY TWO

1. How can alcohol affect someone's facial appearance?
2. Why can drinking alcohol lead to weight gain?
3. Why is the liver particularly at risk from long-term drinking?
4. Why should pregnant women restrict the amount of alcohol they drink?

YOU, FRIENDS AND STRANGERS

PSHE 11-14 WORKSHEET 3

ACTIVITY ONE

Cause and effect

Here are some common effects of drinking too much alcohol, especially for young people. In the grid, tick the boxes to say to who each one may affect.

| | Does this affect the drinker | Does this affect the drinker's friends? | Does this affect other people as well? |
|--|-------------------------------------|--|---|
| vomiting | | | |
| blurred vision | | | |
| can't stand or walk straight | | | |
| being louder than normal | | | |
| saying things you wouldn't normally say | | | |
| causing an accident | | | |
| arguing and fighting | | | |
| making a fool of yourself | | | |
| ending up in hospital | | | |
| having a hangover | | | |
| unable to go to school the next day, or poor school performance | | | |

In small groups, compare your answers. Do you agree with each other? If not, discuss your reasons for the choices you've made.

In general, does getting drunk affect just the drinker or other people?

YOU, FRIENDS AND STRANGERS

PSHE 11-14 WORKSHEET 3

ACTIVITY TWO**Who is the victim?**

Stephen is 15 and was out with three mates in the town. They met up in the shopping centre and had a few drinks and a laugh. Stephen had quite a bit of cash and he drank a few cans of extra-strength cider. He soon became drunk.

It got pretty late and the group was hanging about waiting for the last bus home. Ben started fooling around and teasing Stephen for not being able to handle his alcohol. The drink had begun to hit Stephen's judgement and he started to get dizzy. He playfully lunged forward and hit Ben in the face... then lost his balance, fell over, hit his head, and lost consciousness.

Ben and the two other friends panicked and tried to wake Stephen up. The two others then ran off, not wanting to get involved. Fortunately an ambulance was driving past and Ben flagged it down. The ambulance driver said she was going to inform the police and wanted to know Stephen's parents' phone number. Ben asked her not to involve anyone else, but she said they had to contact them. Stephen and Ben were taken to hospital where they were met by the police.

Read the case study above. It was not only Stephen who was affected by what happened that night - several people were involved in his 'story'. Do the following activity in groups or as a whole class.

'Hot-seat' some of the other characters in the story to find out what they thought. Choose someone to take on the role of the following:

Stephen

Ben

Stephen's other two mates

Police officer

Ambulance crew

Stephen's mum or dad

Ben's mum or dad

Ask questions to find out what each person felt about the evening's events. What did they do wrong? What did they do right? How might the events of the evening affect their attitude to alcohol?

ALCOHOL AND THE COMMUNITY - WHAT IS THE IMPACT?

PSHE 14-16 WORKSHEET 7

In this activity, you will be looking at the impact of alcohol in the community and on individuals, and then holding a debate on the subject in class.

ACTIVITY ONE**Your community**

Think about your local community and the nearest town or city that you, your friends and family visit regularly. Work with a friend, or in a small group, to discuss and answer these questions.

- Who in your community drinks alcohol?
- When do they drink alcohol?
- Where do they drink alcohol?
- Who do they drink with?
- Who serves them alcohol?

ACTIVITY TWO**Balancing act**

Now it's time to consider the ways in which alcohol and social drinking can make a positive and/ or negative contribution to your local community and to individuals. Split your group in two, so that part of the group looks at the positive effects, and the other looks at the negative effects. Remember to consider the effects on individuals as well as the community as a whole. Use the ideas box below to help you.

You may want to develop a presentation to show your ideas. You could use Powerpoint or a similar software. Follow the steps below to help you put together your ideas.

| | | |
|-----------------|-------------------------|----------------------------|
| Supermarkets | Hospitals | Alcoholism |
| Off licences | Police | Schools |
| Restaurants | Local Council | Price |
| Bars | Lively city centres | Going out for lunch |
| Drinks industry | Drivers and pedestrians | Fights |
| Jobs | Agriculture | Celebrating with friends |
| Transport | Local economy | Glass/bottle manufacturers |

ALCOHOL AND THE COMMUNITY - WHAT IS THE IMPACT?

PSHE 14-16 WORKSHEET 7

ACTIVITY THREE**Debate**

Now that you have looked at the positive and negative effects of alcohol in a community and on individuals, split the class into two groups: one group should explain the positive and negative effects of alcohol on individuals and the other group should explain the positive and negative effects on the community.

Then have a vote on the following question:

Are the negative effects of alcohol on the community and the individual greater than the positive effects?

INVESTIGATING THE DEHYDRATING EFFECTS OF ALCOHOL (11-14s)

SCIENCE/ ENVIRONMENTAL STUDIES WORKSHEET 4

About 60% of the adult human body is water. Our cells need plenty of water so the essential processes taking place inside them can work properly. In spite of how much water someone takes in each day, the amount of water in the body usually remains very stable. This is because hormones work to keep the balance right.

The most important of these is ADH, or anti-diuretic hormone. It acts on the kidneys to reabsorb water, so that less water leaves the body in urine. Alcohol reduces the production of ADH so the kidneys produce more urine and the body loses too much water. This means alcohol has a dehydrating effect and explains some of the symptoms of a hangover (e.g. feeling thirsty and headachey).

The dehydrating effect of alcohol (ethanol) can be used to preserve biological specimens. The alcohol kills off decay-causing microbes by dehydrating them, so the specimens do not 'go off'.

ACTIVITY ONE

In this experiment you will investigate the dehydrating effect of alcohol (ethanol) on living cells.

Safety note

An adult should supervise this experiment because ethanol catches fire easily. There must be no fires or naked flames in the room and you shouldn't eat or drink while you are doing this experiment.

Apparatus

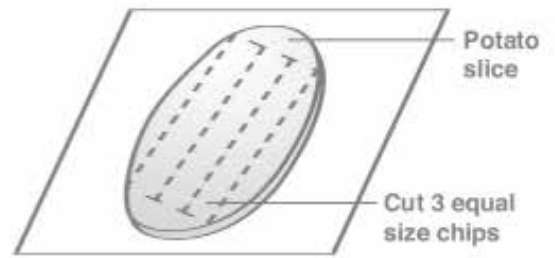
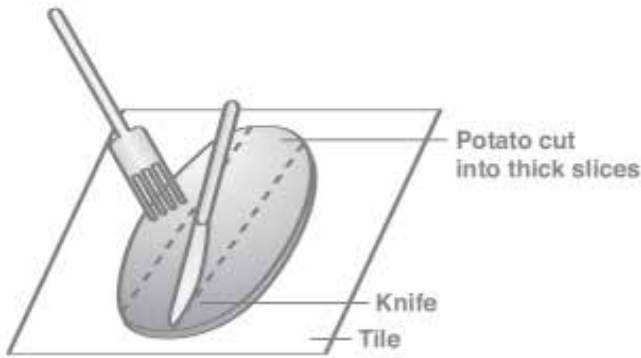
- 250ml beaker
- 100ml ethanol
- large raw potato
- white tile
- forceps or fork
- sharp knife
- cling film
- paper towel
- ruler

Method

Follow the steps shown in the diagrams and record your results in a table similar to the one given.

INVESTIGATING THE DEHYDRATING EFFECTS OF ALCOHOL (11-14s)
SCIENCE/ ENVIRONMENTAL STUDIES WORKSHEET 4

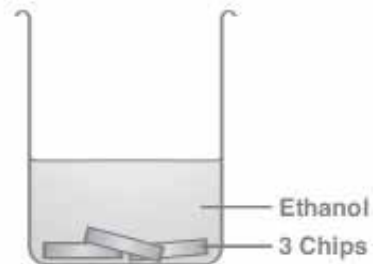
1. Assemble your apparatus.
2. Cut three potato chips of equal size.



3. Measure each chip with a ruler and record your results.



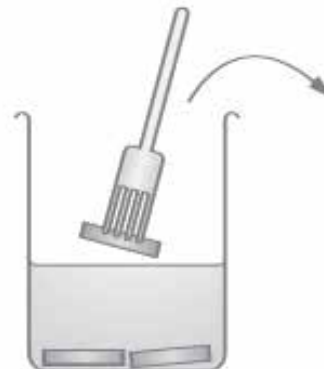
4. Put the ethanol and chips into the beaker.



5. Ensure the chips are fully submerged, and cover the beaker tightly with cling film.

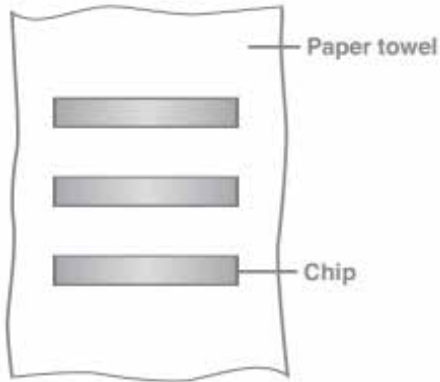


6. After 24 hours, remove the chips from the alcohol and the beaker.



INVESTIGATING THE DEHYDRATING EFFECTS OF ALCOHOL (11-14s)
SCIENCE/ ENVIRONMENTAL STUDIES WORKSHEET 4

7. Place the chips onto a paper towel.



8. Measure each chip again and record your results.



Results

Record your results in a table similar to the one below.

| Start of experiment | | End of experiment | | End result |
|-----------------------------------|--|-----------------------------------|---------------------------------------|---|
| Length of each potato chip (mm) = | Average length of potato chips (mm) (add length of each of the 3 chips and divide by 3 to get the average) = | Length of each potato chip (mm) = | Average length of potato chips (mm) = | Change in average length of potato chips (mm) = |

Conclusion

How does alcohol affect living cells?

INVESTIGATING THE DEHYDRATING EFFECTS OF ALCOHOL (14-16s)

SCIENCE/ ENVIRONMENTAL STUDIES WORKSHEET 5

About 60% of the mass of the adult human body is water. Our cells need plenty of water so the essential chemical reactions place inside them can work properly. In spite of how much water someone takes in each day, the water content of the body usually remains very stable. This is because hormones act on the kidneys and blood system to keep the balance right.

The most important of these is ADH, or anti-diuretic hormone. It is secreted by the pituitary gland and acts on the kidneys to reabsorb water. This means that the body water is conserved and the amount of water leaving the body in urine is controlled.

Alcohol inhibits the secretion of ADH so the kidneys produce more urine and the body loses too much water. That is why alcohol has a dehydrating effect on the human body and leads to the symptoms of a 'hangover' (e.g. feeling tired, thirsty and headachey)

The dehydrating properties of alcohol (ethanol) can be used to preserve biological specimens. The alcohol kills off decay-causing microbes by dehydrating them, so the specimens do not 'go off'.

ACTIVITY ONE

In this experiment you will investigate the dehydrating effect of alcohol (ethanol) on living cells.

Safety note

An adult should supervise this experiment because ethanol catches fire easily. There must be no fires or naked flames in the room and you shouldn't eat or drink while you are doing this experiment.

Apparatus

- 250ml beaker
- 100ml each of 10%, 20%, 30%, 40% ethanol
- large raw fresh potato
- white tile
- forceps or fork
- sharp knife
- cling film
- paper towel
- ruler

Method

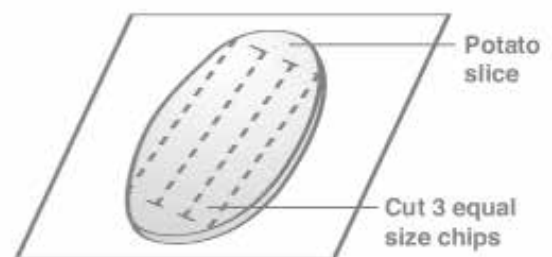
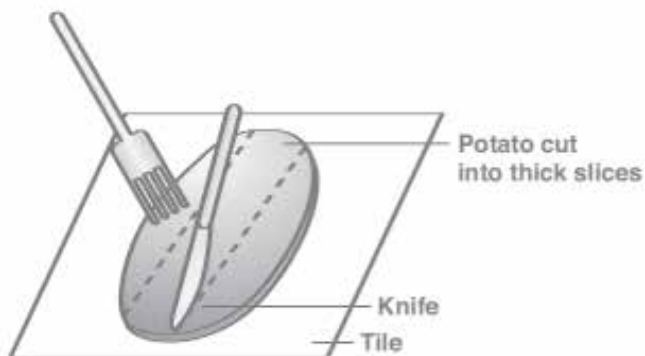
Follow the steps shown in the diagrams and record your results in a table similar to the one given.

INVESTIGATING THE DEHYDRATING EFFECTS OF ALCOHOL (14-16s)

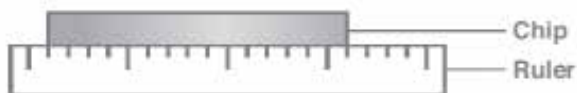
SCIENCE/ ENVIRONMENTAL STUDIES WORKSHEET 5

Follow these steps four times, using a different % concentration of ethanol each time.

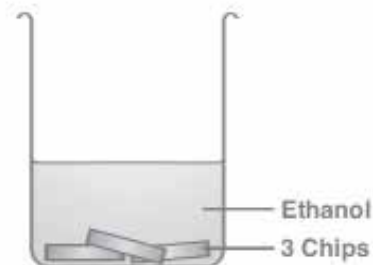
1. Assemble your apparatus.
2. Cut three potato chips of equal size.



3. Measure each chip with a ruler and record your results.



4. Put the ethanol and chips into the beaker.

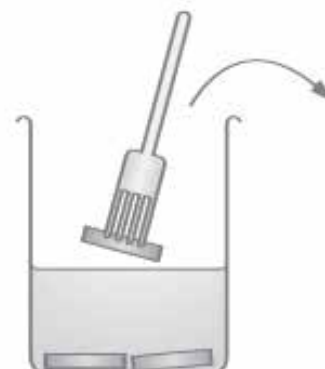


5. Ensure the chips are fully submerged, and cover the beaker tightly with cling film.



SAFETY!
ALCOHOL FUMES
CAN CATCH FIRE

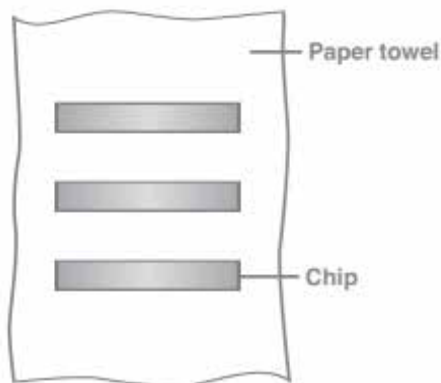
6. After 24 hours, remove the chips from the alcohol and the beaker.



INVESTIGATING THE DEHYDRATING EFFECTS OF ALCOHOL (14-16s)
SCIENCE/ ENVIRONMENTAL STUDIES WORKSHEET 5

7. Place the chips onto a paper towel.

8. Measure each chip again and record your results.



Results

Record your results for each percentage of ethanol in a table similar to the one below.

| | Start of experiment | | End of experiment | | End result |
|--------------------------------------|-----------------------------------|--|-----------------------------------|---------------------------------------|---|
| Percentage (%) ethanol concentration | Length of each potato chip (mm) = | Average length of potato chips (mm) (add length of each of the 3 chips and divide by 3 to get the average) = | Length of each potato chip (mm) = | Average length of potato chips (mm) = | Change in average length of potato chips (mm) = |

Conclusion

1. How does alcohol affect living cells?
2. How does the effect differ with different concentrations of alcohol?
3. Why is alcohol used to preserve biological specimens?
4. Why can drinking alcohol make someone feel thirsty afterwards?

