



Complete, fold and seal
(see note 2 below)

SURNAME: Cripps

FORENAME(S): Luke

12 Pages

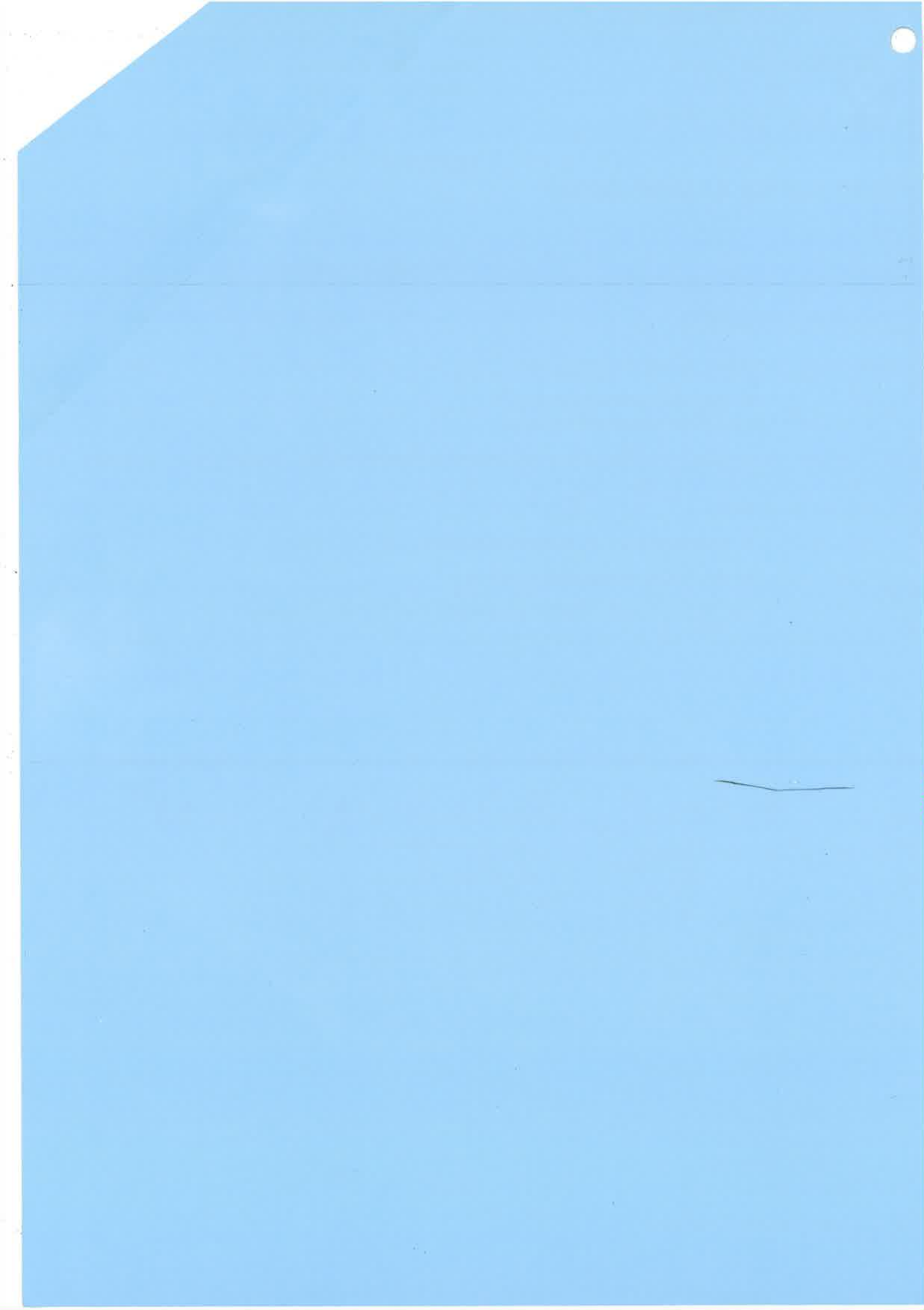
1. Please give the information requested in the boxes below.
2. Enter your name in the space provided to the right, fold over and seal down (using the label provided) to hide your name.
3. The answers must be legibly written. The Examiners can either ignore illegible script or have it typed and the expense of typing charged to the candidate.
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1	Student Number	149407
2	Title of Examination Paper	Sustainability through technology
3	Module Code	M6X02212
4	Date and Time of Examination	16/5/19 12:00
5	Examination Venue	1Q 310
6	Seat Number	6068
7	Number of Answer Books handed in	1

List the numbers of the questions you have attempted	Office Use
3	34
1a	3.5
1b	7.
Total	45.

← Mohamed
Xf

(Gweler yr ochr arall am y fersiwn Cymraeg)



3a) There are many different measures that can be taken by local councils to enforce noise nuisance orders. Noise abatement orders can be ~~used~~ issued against companies or organisers of events. These orders can be ~~applied~~ fought by the defendant, where evidence can be shown to illustrate the increase in noise level. If a noise nuisance complaint has been made against an individual, an ASBO can be issued. As ASBOs are issued to an individual, the method of resolving the noise issue will be different in each case.

6
AP
OK.

3b) At Brands Hatch, there are many methods that have been used to reduce its noise impact. Firstly, the maximum number of race meetings allowed for class 3 vehicles is set at 6. Similarly, class 2 race weekends are set at a maximum of 6 as well. Furthermore, on any race weekend where both class 2 and 3 vehicles are present, the quota of race class 3 race meetings is the only one affected.

Also, there are static noise tests performed on all vehicles before they are allowed to use the race track. The noise limits are:

indy circuit (daytime) = 105 dB(A) ✓ $\frac{1}{2}$
 indy circuit (evening) = 102 dB(A) ✓ $\frac{1}{2}$
 grand prix circuit = 102 dB(A). ✓ $\frac{1}{2}$

If a vehicle does not ~~meet~~ comply with ~~the~~ noise limit, access to the circuit will be refused, unless modification can be made, and the test carried out once more. As well as static testing, drive by testing is also carried out, with the location of test being Podhock Hill Bend. The limit for this test is set at 92 dB(A). If a vehicle is found to be over the ~~the~~ drive by noise limit, they will be refused access to the track unless modifications can be made to vehicle, and then retested.

On track days, ^{only} class 1 vehicles are permitted to use the race track, provided they have passed the 2 noise tests. Tyre squeal is also monitored around the lap. Anyone producing excessive tyre squeal will be warned 2 times, on the third, they will be prohibited from using the race track for the rest of the day.

Nice details ✓

36) Brands Hatch work closely with the NLPC, West Kingsdown Parish Council, and the BHLG, the Brands Hatch Liaison Group, to make sure the local residents are informed of any and all activities taking place at the race circuit. ✓
All information is available ~~on the~~ online, with the MSV, owners of Brands Hatch aiming to inform residents of any actions 3 months before the intended date, with 30 calendar days being the minimum amount of time to notify the local people. ✓

Furthermore, all competitors are informed of noise ~~3~~ limits before arrival at the race track, with the information also being issued when bookings, either through telephone or online. ✓

Snetterton, also owned by MSV, follow very similar noise ~~3~~ guidelines to Brands Hatch. Having a noise limit of 105 dB(A) during the daytime, and 102 dB(A) in the evening, with a drive by limit of 92 dB(A). However, only a maximum of 4 race weekends using class 3 vehicles are allowed through a calendar year. ✓ Furthermore, a maximum of 4 hours of running a day are allowed for class 3 vehicles over that weekend. ✓

Once again, only class 1 vehicles are allowed for track days, providing they have passed both static and drive by noise tests. ✓

Additionally, other methods can be used to reduce noise impacts at race circuits. Trees can be planted around the noisier sections of the circuit, although ~~the~~ very cost effective, the time needed to grow the trees makes it impractical. ✓ Also, grass ~~near~~ verges can be created to keep the noise around the circuit. Although more expensive than growing trees, much more time ~~effective~~ effective. ✓

1a) Legislation for emissions in Europe has become much stricter, moving from Euro 1, to Euro 6 standards now, with Euro 7 moving closer. Diesel powered cars have been focusing more on particulate matter over the last few changes of standards. Petrol engines have been focusing on NOx emissions, with these emissions becoming ~~more~~ monitored within diesel engines as well. *Lacking other emissions + MC's*

3.5.

1b) Hydrogen can be used as a fuel instead of petrol and diesel. An engine running on ~~eth~~ hydrogen is more efficient compared to a petrol / diesel engine, and only produces H_2O as emissions coming out of the exhaust. One of the major issues with using hydrogen, is how do you store it. Having a ~~melting~~ ^{boiling} point below $0^\circ C$, keeping it in liquid form is very difficult. As well as this, where would you be able to ~~refill~~ refuel your hydrogen powered vehicle.

Methanol is also an alternative source of fuel to petrol and diesel. Methanol can be made in many forms, corn based and algae based amongst others. Both of these methods are cost effective against petrol and diesel powered vehicles, but emissions produced by methanol may still include CO_2 and CO due to ~~oxygen~~ ~~being present in~~ chemical structure of methanol. There are some ethical issues around the use of methanol. For example, for the corn based version, where would the crops be planted so that growth of the crop would not be impaired.

?
Confusion
with
Ethical

*Lacking lots of details
Confusion between Methanol
and ethical.*

Question No.

Examiner Only

Question No.

Examiner Only

Arholwr yn yr

Rhif y Cwestiwn

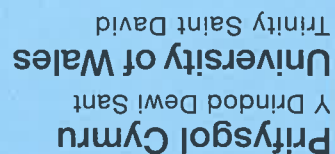
Question No.

Examiner On

Arholwr yn unig

It y Cwestiwn





12 Tudalen

1. Rhwch yr holl wybodaeth y gofynnir amdani yn y blychau isod.
2. Rhwch eich enw yn y lle a ddarparwyd ar y dde, plynwch et a'i selio i lawr (gan ddefnyddio'r label a ddarparwyd) i guddio'ch enw.

3. Rhaid i'r atebion fod mewn llawysgrien ddarlennadwy. Gall yr Arholwyr rai all atanybyddu sgrïpt annarllennadwy, neu drethu iddi gael ei theipio a chael yr ymgeisydd i dalu.

4. Ysgriennwch eich atebion mewn inc.
5. Dechreuwch bob ateb ar dudalen newydd. Gwnewch unrhyw fras nodiadau yn y llyfr atebion a thynnu llinell drwyddynt.

6. Ni ddylid rhwgo unrhyw ran o'r llyfr hwn; maird ei gyflwyno yn gyfan.

8. Rhaid dychwelyd pob llyfr. Ni chaniateir mynd â llyfrau atebion, wedi eu defnyddio neu heb eu defnyddio, allan o'r lleoliad arholi o dan unrhwy amgylchiadau.

7	Nifer y Llyfrau Atebion a gyflwynwyd	
6	Rhif Sedd	
5	Lleoliad yr Arholiad	
4	Dyddiad ac Amser yr Arholiad	
3	Cod y Modwl	
2	Teitl y Papur Arholiad	
1	Rhif Myfyriwr	

[illegible]

(See the other side for English version)

Llenwch, plygwch a seliwch
(gweler nodyn 2 isod)

CYFENW:

ENW(AU) CYN TAF:

ENW(AU) CYNTAF:



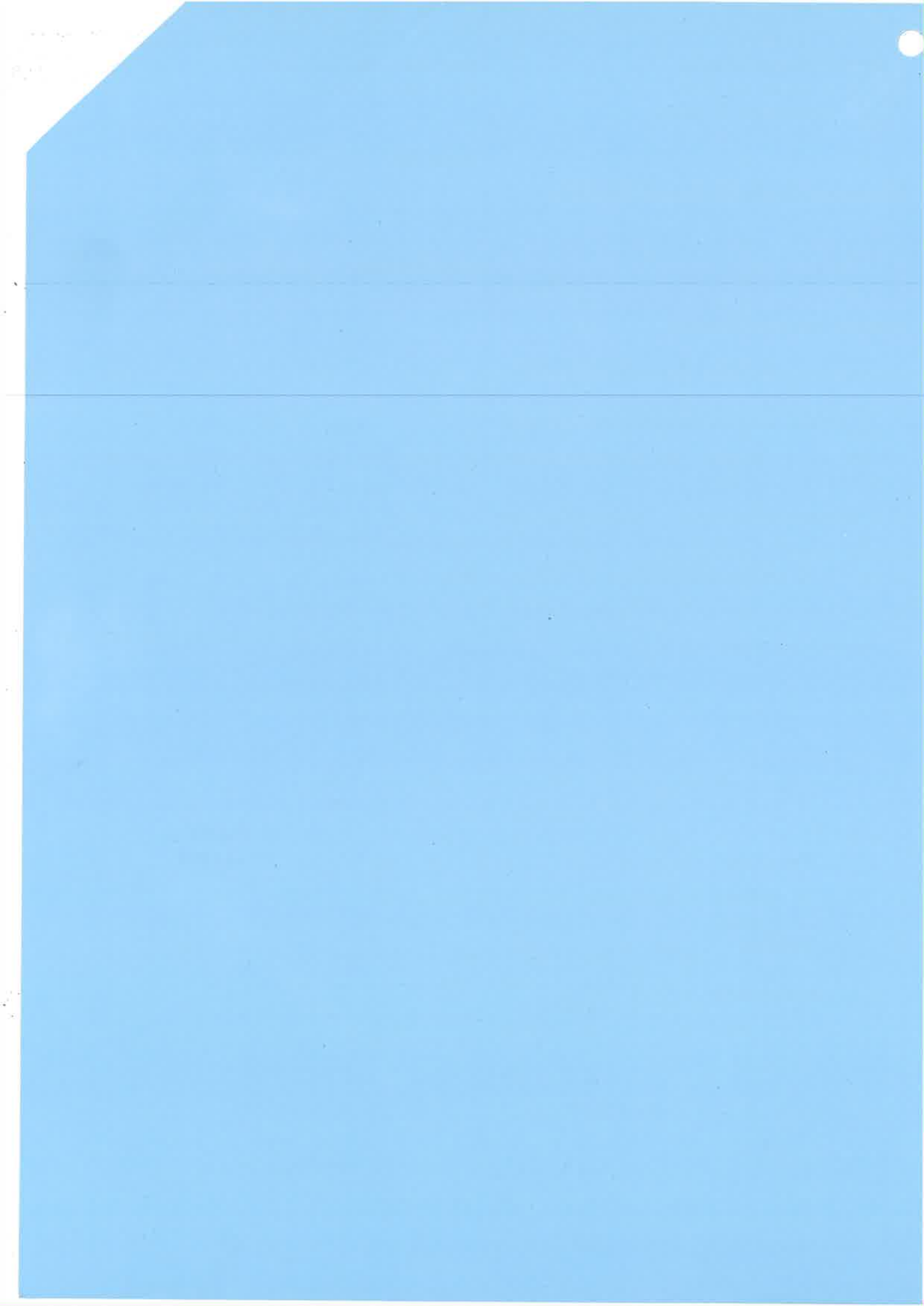
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(see note 2 below)**

FORENAME(S): Samuel

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List the numbers of the questions you have attempted	Office Use
1a	7
1b	15
3a	6
3b	17
Total	45 %

Marks agreed



7.
No mention
of MCs.

No mention
of MCs.

Rhif y Cwestiwn

emissions for petrol across its life cycle whilst still producing between 2 and 36 times the output for the same ~~area~~ quantity of fuel.

Ethically it is a double edge sword for bioethanol; on one hand the fuel is renewable ~~and~~ and can ~~potentially~~ potentially be carbon neutral. On the ~~other~~ other hand the land used for growing the crops for fuel could also be used for ~~growing~~ growing food crops which could ~~be seen~~ mean less food for the ~~popula~~ population which ~~increases~~ increases the chance of food shortages compared to if the land was ~~used~~ used for food crops instead of ~~energy~~ ~~fuel~~ fuel crops.

Another problem is the crops used for fuel tend to require ~~certain~~ certain conditions to grow which limits where you can ~~at~~ grow them. ~~Corn~~ Corn generally needs warm ~~and~~ weather with rich soil while ~~sugarcane~~ sugarcane needs tropical environments to thrive.

Biomass and algae ~~are~~ tend to ~~be~~ be more flexible in ~~the~~ terms of ~~growing~~ growing conditions as ~~well~~ well as being better ethically as both ~~can~~ can be grown where food crops cannot grow as biomass can grow on ~~unusable~~ unusable land for food crop ~~growing~~ farming while algae can even be farmed ~~underwater~~ underwater significantly increasing where it can be ~~farmed~~ farmed.

Another ~~alternative~~ alternative fuel is ~~The~~ The ~~modifications~~ modifications needed to be done to the car mainly involve ~~the~~ changing the engine map of the ECU to accommodate the different ~~fuel~~ fuels and the ~~availability~~ availability

availability of bio ethanol is ~~increasing~~ increasing

Nope.

What needs changing?

not marine although more and more stations are ~~being~~ having bioethanol as one of the options increasing availability of the fuel in the UK. Brazil has taken this a step further by becoming completely self ~~sufficient~~ sufficient ~~in~~ thanks to biofuels.

Another option for alternate ~~fuel~~ fuel is hydrogen. Hydrogen is arguably the most renewable fuel as ~~hydrogen~~ hydrogen is the most ~~abundant~~ abundant source in the ~~known~~ known universe. The emissions are also ~~very~~ very low being effectively just water as ~~hydrogen~~ hydrogen ~~is~~ hydrogen ~~from~~ from the ~~fuel~~ fuel stored in the fuel cell ~~combiner~~ combiner with oxygen from the air to form water.

Hydrogen can tend to lack the power of the fossil fuel equivalents ~~and~~ also the ~~availability~~ availability of ~~hydrogen~~ hydrogen fuels ~~is~~ is very poor. Another problem is that to run on hydrogen ~~and~~ extensive ~~modifications~~ modifications are needed to be done including replacing the fuel tank with fuel cells to ~~convert~~ convert a car ~~with fossil fuels to hydrogen~~ with fossil fuels to hydrogen.

3a

In the event of a ~~noise~~ noise nuisance order, Councils can use a number of methods to ~~combat~~ combat this problem.

One method is to limit the number of days the track is allowed to operate ~~as well~~ including limiting how often certain categories of cars can ~~access~~ access the track as well.

The ~~limitation~~ limitation as to what time of day the

Ambiguous.

late tracks ~~that~~ can operate. They ~~can~~ can also ~~be~~ written the noise limit of the ~~cars~~ cars to reduce ~~the~~ the sound ~~coming~~ coming from the track. ~~As well as limit the number~~ The council can also issue fines to penalise tracks with noise complaints to encourage the tracks to solve the noise problem. ~~The~~ The ~~council~~ council could also limit ~~the~~ the number of cars on track to reduce the noise as well as use sound reducing foam and ~~the~~ plant trees to ~~reduce~~ reduce sound leaving the track.

In a worst case scenario, the Council could force the race track to close altogether, if the track fails to deal with the noise nuisance orders.

36 ~~There~~ Race tracks can implement multiple measures to reduce noise ~~and~~ which will be shown in the following case studies.

the first. In the case of Silverstone they ~~generally~~ ensure that all vehicles have a silencer to reduce noise and the sound of vehicles ~~can~~ cannot exceed 102 db for the National Circuit and 105 db ~~for~~ for the GP circuit. They also limit the ~~time~~ time that the vehicles can operate around the race track. Silverstone also ~~not~~ routinely ~~the~~ the car ~~is~~ giving a static sound test as well as ~~testing~~ testing on track sound ~~testing~~ while ~~on track~~ the vehicles are out on track to make sure the cars are not exceeding the noise limits. ~~The~~ large ~~events~~ ~~can~~ ~~be~~ Silverstone also only runs a certain number of days per year and of those ~~days~~ ~~at~~ ~~days~~ ~~only~~ certain

types of cars are limited to certain days
a year.

Like silverstone, Brands Hatch has a noise limit on ~~cars~~ vehicles although the noise limit depends on ~~the~~ the vehicle. e.g. Rally cars cannot exceed 108 db while road rally cars cannot exceed 105 db. ~~With~~ Silence ~~cars~~ are also mandatory on all vehicles using the track. Brands Hatch also, like silverstone, does a static noise test and measures on track noise of the car too, and like with silverstone ~~any~~ ~~any~~ ~~any~~ vehicles exceeding the noise ~~limit~~ limit of the track will not be able to participate on the track of the rest of the ~~day~~ ~~day~~ day. Brands Hatch also ~~can~~ only run on a certain ~~max~~ ~~max~~ number of days per year ~~as~~ ~~as~~ well as limiting ~~when~~ ~~when~~ what time vehicles can run too. There is also a forest near Brands Hatch which helps to reduce the noise leaving the track and reaching ~~near~~ nearby ~~towns~~ ~~towns~~, villages and cities ~~in~~ area.

Question No.

Examiner C

Question No.

Examiner C

Question No.

Examiner C

Arholwr yn unig

f y Cwestiwn

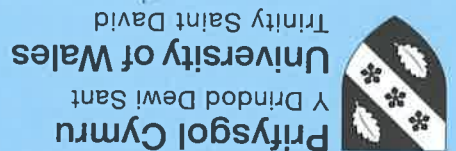
Question No.

Examiner O

Arholwr yn unig

y Cwestiwn





Llyfr Atebion Arholiadau

12 Tüdalen

Cyfarwyddiadau i Ymgeiswyr

1. Rhwch yr holl wybodaeth y gofynnir amdani yn y blychau isod.
2. Rhwch eich enw yn y lle a ddarparwyd ar y dde, plygwch et a'i selio i lawr (gan ddefnyddio'r label a ddarparwyd) i guddio'ch enw.

1. Rhaid i'r atebion fod mewn llawysgrifen ddarllenadwy. Gall yr Arholwyr naill ai anwybyddu sgript annarllenadwy, neu drefnu iddi gael ei theipio a chael yr ymgeisydd i dalu.
2. Ysgrifennwch eich atebion mewn inc.
3. Dechreuwch bob ateb ar dudalen newydd. Gwnewch unrhyw fras nodiadau yn y llyfr atebion a thynnu llinell drwyddynt.
4. Ni ddylid rhwgo unrhyw ran o'r llyfr hwn; rhaid ei gyflwyno yn gyfan.
5. Os defnyddir mwy nag un llyfr, rhwymwch hwy gyda'i gilydd gan ddefnyddio'r tagiau sydd ar gaet oddi wrth y gwyllwyr/gwylwyr.
6. Rhaid dychwelyd pob llyfr. Ni chaniateir mynd â llyfrau atebion, wedi eu defnyddio neu heb eu defnyddio, allan o'r lleoliad arholi o dan unrhyw amgylchadun.

7	Nifer y Llyfrau Atebion a gyflwynwyd	
6	Rhif Sedd	
5	Lleoliad yr Arholiad	
4	Dyddiad ac Amser yr Archoliad	
3	Cod y Modwl	
2	Teitl y Papur Arholiad	
1	Rhif Myfyrwr	

[illegible]

(See the other side for English version)

Llenwch, plygwrch a seliwrch
(gweler nodyn 2 isod)

CYFENW:

ENW(AU) CYNTAF:

ENW(AU) CYNTAF:



Complete, fold and seal
(see note 2 below)

FORENAME(S): EDUARDO

12 Pages

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1	Student Number	PI41054
2	Title of Examination Paper	SUSTAINABILITY THROUGH TECH
3	Module Code	MGX02212
4	Date and Time of Examination	17/05/19
5	Examination Venue	SA1
6	Seat Number	6060
7	Number of Answer Books handed in	2

List the numbers of the questions you have attempted	Office Use
3a	13
3b	24
1a	0
1b	13
Total	50

{ Agreed. AS

③

a) the legislation that a council could apply to control the noise are mentioned and explained at the following paragraphs.

- Control of Pollution Act 1974. ✓
Enable the authorities to inform the council about nuisance to control the noise of ice-cream, speakers at the street.. etc. ✓
- Health & Safety at work act 1974. ✓
In order to cover the employees when they are working, this law protect them from high dB at work, establishing limits of dB depending the working area and providing safe staff to cover and prevent ~~damages~~ future damages. ✓
- Town and country planning act 1990. ✓
Established to control noise per neighbourhoods in order to avoid conflicts between people. ✓
- Noise act 1996 ✓
Enable authorities to measure the noise to prevent high dB. Also ~~states~~ the noise has a limit and is not permitted to pass it. Every council and town has their own "rules" and the law is slightly different on each one. ✓
- Anti-Social Behaviour act 1990. ✓
Enable authorities power to:
 - Council Inquiries
 - CPN
 - PSPO
 - Send person to the court

In 2003 also the law was modified being more restricted and given more power to the local authorities. ✓

b) Since motorsport became a high public sport, there was a battle between the circuits and the people who lives near the circuits. ✓

During the years laws became more and more restrictive and sometimes a group of people near the circuit do a demand to the circuit trying to reduce the noise.

For those reasons different ways to controll and reduce the noise have been implemented along the years, there are some case at specific circuits which had the good idea to solve the problem that they had.

- Rockingham circuit.

~~the~~ After several complaints by the neighbour, the circuit had the idea to implement a very precise method to measure the vehicles that come into the circuit.

First of all the circuit decided to separate the vehicles in different ~~car~~ class, each class has a limit of dB depending the area where is measured. But, how they measured?

They put 2 devices, one at North of the circuit and another one at South.

Both devices are wireless connected to the CPU of the circuit given them

at real time the dB at each zone, is also connected to the council to avoid future problems. ✓

- Downing Park

this circuit has a several rules and very clever ideas to avoid future problems, they agreed with the council the following facts and rules to avoid problems:

- they have limited the number of days for each type of event and vehicle. ✓

For example:

- Type A: 93 dB $\geq$ ~~x~~ $\geq$ 107 dB 60 days ✓
- Type B: 84 dB $\geq$ x $\geq$ 93 dB 60 days ✓
- Type C: no limits (F4) 4 days ✓

- the hours of the circuit are also limited ✓ and restricted too with a non-permitted session after 17:30h. ✓

Remember that these measurements are static and with the MSA rules and approval. ✓

- the Sorane Circuit

developed in the 60's and having being a very important circuit for motor GP and the national ~~track~~ ^{champion} championships; the emblematic circuit of motor is almost died due to the complaints of the neighbors.

One of the important aspect when a circuit is developed is to select the best location ✓ to avoid noise problems.

Nice!

with the people who lives near the circuit. The circuit is in the middle of a small village called Cienpozuels and to come into the circuit, you have to pass across the village.

Typical customer of the circuit has a higher noise ~~than~~ and basically they are always partying and making noise. The neighbors are bored of this actions and actually the circuit is limited to track day on Sundays & Saturdays & test drives ~~each~~.

The solution will be disassembling the circuit and develop in other location, not in the middle of a town.

Other cases of studie to consider are Craft, who had to paid \$137k. to a family and took of lawyer fees, and Castle Cany who bring the circuit with less activity in UK had to reduce the track and event day of circuit losing money.

Other measures to reduce the noise are:

- Implementation of acoustic panels
- Design of earth ground at the circuit
- Using Asphalt PA-12, which is porous and reduce the noise of the tyres.
- Tyres and Aerodynamic design.

24

Nice work

① - LPG or Liquid Gas

Developed in the 90's and launched to the market in 00's.

Is an alternative fuel formed with liquefied Butane or Propane.

Cheaper than petrol and diesel (DIT) due the main gas C_2H_6 and C_4H_{10} are very cheap.

The process to obtain liquid gas is by high compression. ~~the process to be~~

Is the most common alternative fuel already in use.

Price are between 0.45 €/l and 0.6 €/l.

~~Reverse~~ Usually is used in petrol engines.

To use in petrol engines ~~is~~ is mandatory to change the petrol injection system implementing new injectors, new gas tank, new gas lines. The petrol injection system still can be usable.

One of the common problem is that is driver than normal petrol and sometimes the system generates lubrication problem and will affect to the headgasket.

Is very useful implement LPG in vehicle which do a lot of miles daily as a taxi or a transport vehicle.

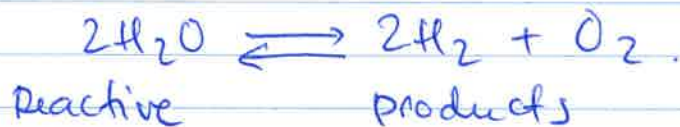
The cost approx to implement the system is around £2k depending the engine and the number of cylinders.

It would be a good idea some benefit for the government to help people who want to put this system and can't afford the initial cost.

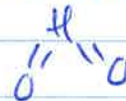
The emissions are lower than petrol and diesel.

- Hydrogen

the decomposition of an H_2O molecule provides $H_2 + O_2$. the H_2 is used as fuel and the O_2 is a product that will come via the exhaust system.



the vehicle can use water as fuel, to do that an electric reaction has to be done using HA for example creating e^- to disassemble the ionic link of the H_2O molecule.



the problem is that is necessary a lot of energy to destroy the links and the reaction is not very stable.

But, what is the most important stuff of this "fuel"?

- The Government and the companies behind.

- What will happen if finally we can use H_2O as fuel in a IC engine?

- The most important petrol companies as Shell, BP, Esso... etc. will be broke. and the government will not get paid the max than the 10% of the taxes that the petroleum companies has to pay every year. The government would lose ~~over~~ BILLIONS.
So, this will happen?

Some confusion here

Contradiction
None cited
near

- I don't think so,

there is ~~another~~ others alternative fuels as
Bio-diesel (herring fat, vegetables)...etc,
Ammine-fuels, etc but, in my opinion, those
fuels can't be consolidated in the market
until the companies which develop this fuels
and the government find a solution.

Eduardo Aguilar.

Question No.

Examiner

Arholwr yn unig

f y Cwestiwn

Question No.

Examiner C

Question No.

Examiner Only

Arholwr ym l

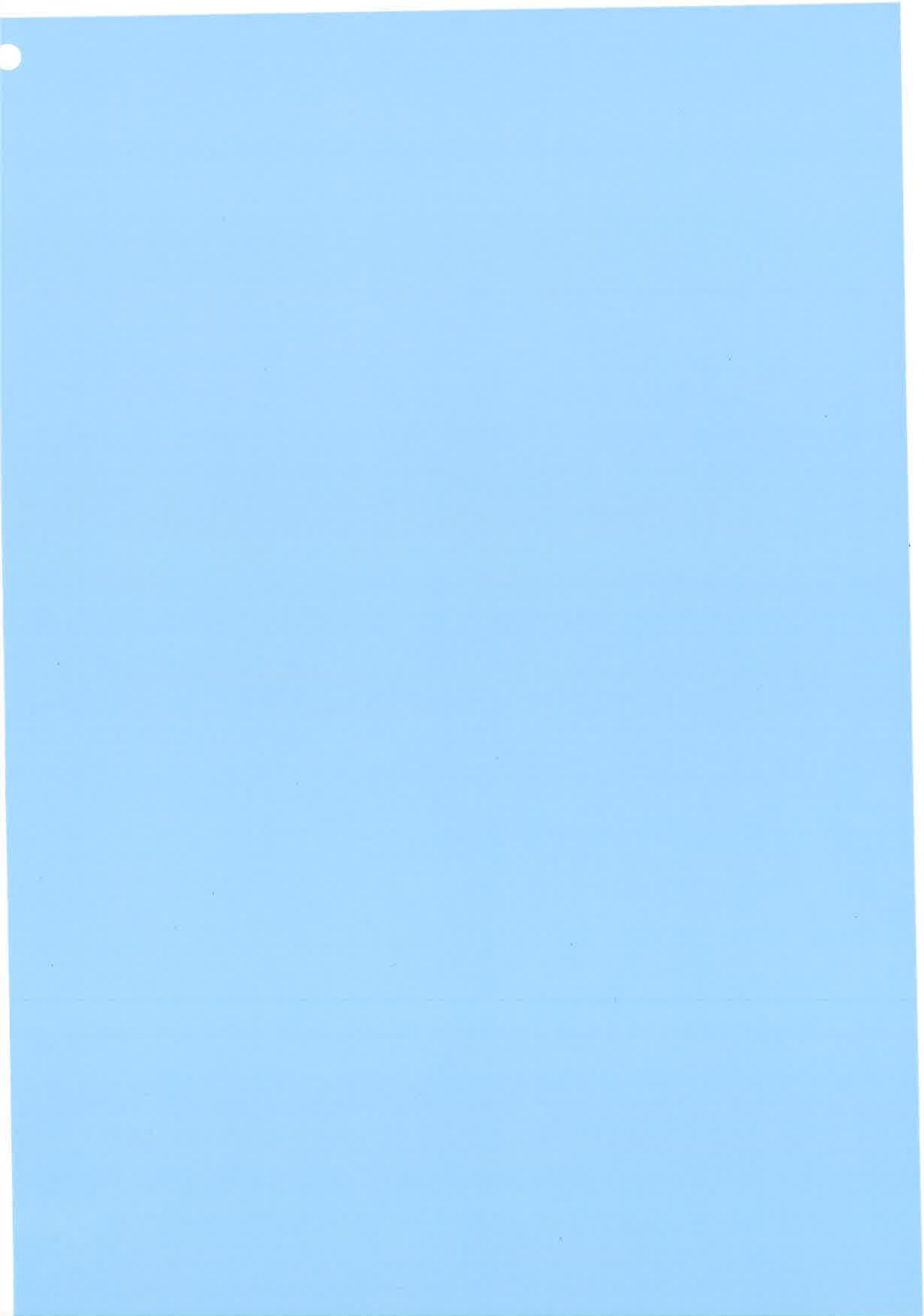
Rhif y Cwestiwn

Question No.

Examiner C

Arholwr yn unig

Y Cwestiwn





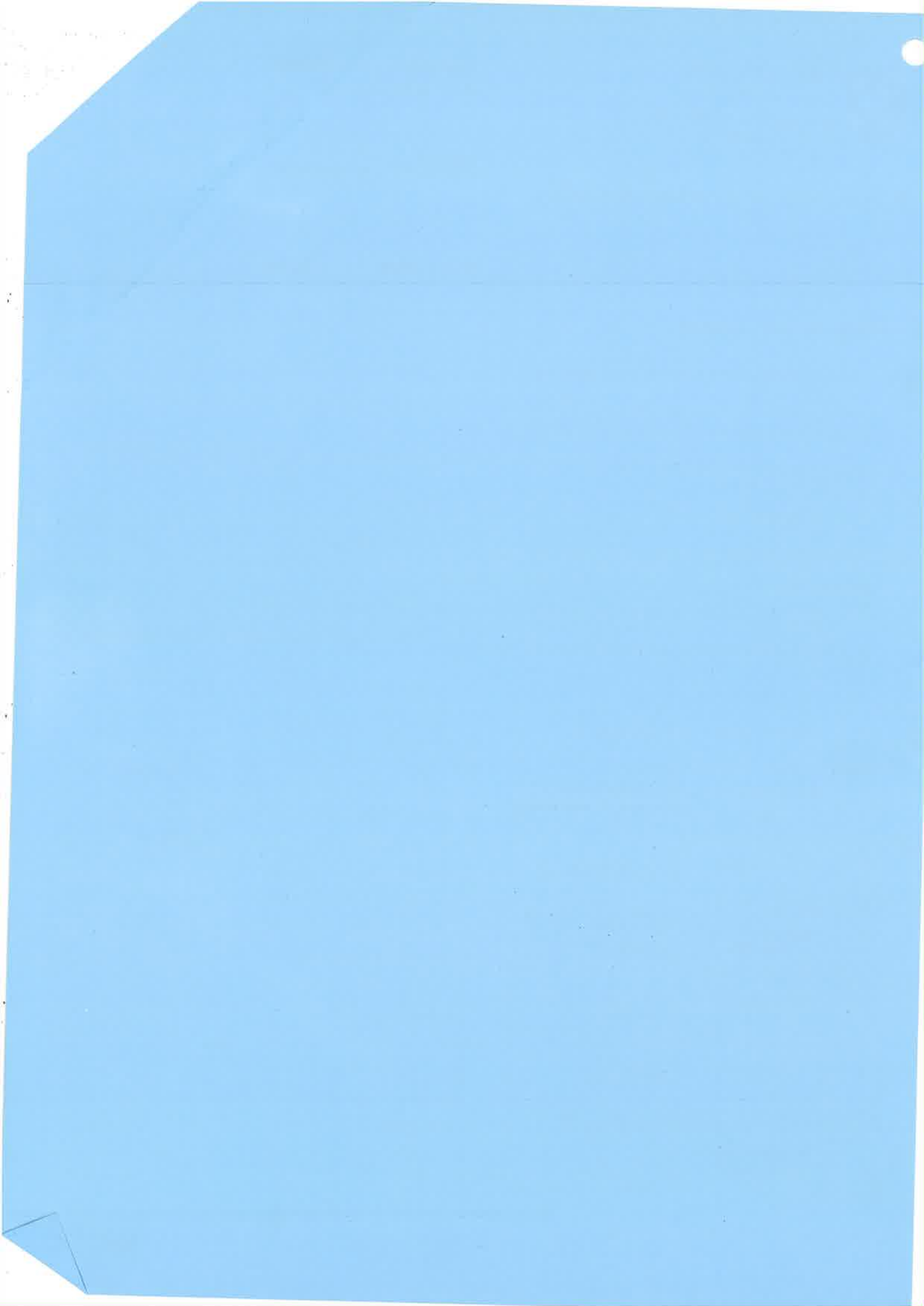
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1	Student Number	P146629
2	Title of Examination Paper	Sustainability through technology
3	Module Code	M6X02212
4	Date and Time of Examination	16 th May 2019 12 pm
5	Examination Venue	310
6	Seat Number	6066
7	Number of Answer Books handed in	

List the numbers of the questions you have attempted	Office Use
2	19
3	34
Total	53

(Gweler yr ochr arall am y fersiwn Cymraeg)



(2)

(A)

The life cycle analysis can be broken down in to four stages.

① Raw material and extraction ✓

The raw material extraction is seen to be the start of each and any product. This stage is where the raw materials are produced, for example where we see steel produced the start of this would be to get the iron ore. This is also more so done in less fortunate countries where mining for the first product is cheaper. This means for the overall green image it is more complicated to monitor how the company is managing it. ✓

② Product Manufacture ✓

The second stage of vehicles life cycle is product manufacture. This is the stage where we see major manufacturers starting to produce the vehicles, by buying the raw materials and starting the production line. In the UK there is not as much major manufacturers as there were and this is down to cost. As the major manufacturers are producing so many vehicles it is crucial that they can monitor their green image. By using more carbon offsetting these companies are able to ~~show~~ offset their carbon image and be able to maintain an overall balance. ✓

✓

②

③ The vehicle use phase ✓

This stage of the vehicle life cycle is where most people understand. A vehicle is a major part to people's life as it is their form of transport. Unfortunately people only see a car as an object and a lot of people do not understand the drawbacks it can have on the environment.

④ The End Phase ✓

The End Phase of a vehicle is quite tricky to understand as where some people would see its vehicle life end others can see it as a use. ✓ As repairing vehicles can be expensive more and more cars are seen to be scrapped, where as some people might see a major use for the vehicle by fixing it and giving it a new lease of life. Again others might see a use by stripping the vehicle and using it for parts in order to keep other cars on the road. ✓

2

③ The goals set by the EU:-

- To introduce more recycled materials into the manufacturing market. ✓
-

exp

②

③

By introducing an End of life directive to the market in 2000 it has enabled more manufacturers to understand a major problem. ✓

The main issue that is being seen more and more is a one ^{use} time purpose. This means that the product should have more use than just one thing. ✓ By introducing this it pushes more and more manufacturers to think of and be more innovative about their product. ✓ By generating a product that can be easily used into something else it can generate more use less waste and also less manufacturing cost. ✓

OK.

⑦

JP.

(3)

(a)

- Noise pollution act 1990 ✓
- Health and safety act 1994 ✓
- Anti Social act ✓
- Neighbours and community act 1996 ✓

The noise pollution act is one of the main and simplest one to understand as it can apply to various noise complaints. By creating the act the local council is enabled to take action and look into why the race track is causing issues and also what can be done to solve it. This could entail giving the person who made the report a recorder so they are able to understand when it is happening and how to resolve it. ✓

The health and safety act can apply to various places as this act is a generic safety overview of what ever is going on. It will make sure that everything is run properly and everyone is as safe as they can be. ✓

Anti Social act. This applies more to the outskirts of the track which can ensure that the customers are leaving in an appropriate level and that they are not putting themselves or any others at risk. This act can be enforced by the police and if anyone is driving out of the track in an anti social manner a Section 59 can be given. ✓

- ③ ② Neighbour and community act 1996 this act ~~apply~~ applies to the surrounding community and makes sure that ~~everything~~ everything is fine and nothing is bothering the area. ✓

(18)

③ Brands Hatch noise management

Brands Hatch have set a management plan in order to reduce their noise pollution.

They state :-

No racing engines shall be started before 8:15 on Friday, Saturday and bank holidays and before 9:15 on Sunday. ✓

Racing times :

8:30 - 18:30 - Friday, Saturday, bank holiday /
9:30 - 18:30 - Sunday

By using selected and allocated times they hope to see less nuisance for the Neighbours.

They also clearly state that on remembrance Sunday all class 1, 2 and 3 vehicles will stop racing between 10:15 and 11:15 ✓

Decibel limits

Each vehicle is subject to a static test before entering the track

Indy circuit day = 105 dB(A) ✓

Indy circuit night = 102 dB(A) ✓

- ③ ① Brands Hatch have also put a drive by monitor on the paddock hill section on the Indy circuit. This will enable them to monitor the vehicles on track.

This limit was set to 98 dB(A) in 2008

All data logged will be stored for a minimum of one year in case the msa need to view it.

The static noise test will be taken in an allocated location and an msa Scientist will be conducting them.

Brands Hatch made clear that a good relationship with their Neighbours is crucial. They state that if the Neighbours are notified in good time of any Noise upcoming events there is much of a less ~~chance~~ chance of disturbance.

If Brands Hatch is still undergoing noise issues they could look into wind blocks and tunnels on certain corners where the Noise may be amplified this is a physical way to improve the track instead of lowering the Vehicle Limit again.

Still
lacking evaluation.

AP

16

Question No.

Examiner Only

Arholwr yn unig

Rhif y Cwestiwn

Question No.

Examiner Only

Arholwr yn unig

rhif y Cwestiwn

Question No.

Examiner Only

Arholwr yn unig

2rth y Cwestiwn

Question No.

Examiner Only

Question No.

Examiner On

Arholwr yn unig

hif y Cwestiwn

Cyfarwyddiadau i Ymgeiswyr

1. Rhwch yr holl wybodaeth y gofynnir amdani yn y blychau isod.
2. Rhwch eich enw yn y lle a ddarparwyd ar y dde, plygwch ef a'i selio i lawr (gan ddefnyddio'r label a ddarparwyd) i guddio'ch enw.

3. Rhaid i'r atebion fod mewn llawysggrif ddarllenadwy. Gall yr Arholwyr naill ai anwybyddu sgrifft annarllenadwy, neu drefnu iddi gael ei theipio a chael yr ymgeisydd i dalu.
4. Ysgrifennwch eich atebion mewn inc.
5. Dechreuwch bob ateb ar dudalen newydd. Gwnewch unrhyw fras nodiadau yn y llyfr atebion a thynnu llinell drwyddynt.

5. Dechreuwch bob ateb ar dudalen newydd. Gwnewch unrhyw ffras nodiadau yn y llyfr atebion a thynnu llinell drwyddynt.
6. Ni ddylid rhwgo unrhyw ran o'r llyfr hwn; rhaid ei gyflwyno yn gyfan.
7. Os defnyddir mwy nag un llyfr, rhwymwch hwy gyda'i gilydd gan ddefnyddio'r tagiau sydd ar gael oddi wrth y gwyllwyr/gwilywr.
8. Rhaid dychwelyd pob llyfr. Ni chaniateir mynd â llyfrau atebion, wedi eu defnyddio neu heb eu defnyddio, allan o'r lleoliad arholi o dan unrhyw amgylchiadau.

arholi o dan unrhyw amgylchiadau.

7	Nifer y Llyfrau Atebion a gyflwynwyd	
6	Rhif Sedd	
5	Lleoliad yr Arholiad	
4	Dyddiad ac Amser yr Arholiad	
3	Cod y Modwl	
2	Teitl y Papur Arholiad	
1	Rhif Myfyrwr	

Rhestrwch rifau'r cwestiynau a ymgaiswyd gennyh	
At Dibenion y Swyddfa	Cyfanswm

(See the other side for English version)

Llenwch, plygwrch a seilwch
(gweler nodyn 2 isod)

CYFENN:

ENW(AU) CYNTAF:



12 Pages

1. Please give the information requested in the boxes below.
2. Enter your name in the space provided to the right, fold over and seal down (using the label provided) to hide your name.
3. The answers must be legibly written. The Examiners can either ignore illegible script or have it typed and the expense of typing charged to the candidate.
4. Write your answers in ink.
5. Begin each answer on a fresh page. Do all rough work in the answer book and cross it through.
6. No part of this book is to be torn out; it must be handed in complete.
7. If more books than one are used, fasten them together using the tags available from the invigilator(s).
8. **Every book must be handed in. In no circumstances may answer books, used or unused, be taken out of the examination venue.**

1	Student Number	P147482
2	Title of Examination Paper	Sustainability through technology
3	Module Code	m6x02212
4	Date and Time of Examination	16/05/19 12:00
5	Examination Venue	310
6	Seat Number	6067
7	Number of Answer Books handed in	1

List the numbers of the questions you have attempted	Office Use
2a	15
2b	12
3a	9
3b	29
Total	65

(Gweler yr ochr arall am y fersiwn Cymraeg)

Mark agreed.
lovely.
J.S.



2 a) The four Stages of a Vehicle's life cycle include: Sourcing/mining of the raw materials necessary to produce the vehicle, the manufacturing process of the vehicle, the lifetime emission output of the vehicle and finally the end of life disposal of the vehicle.

The issues with Sourcing/mining of raw materials necessary to produce a vehicle are as follows; The emission output from mining raw materials such as iron and other materials required to manufacture steel is not only inelastic and damaging to the local area, but also produces high emission levels due to the heavy machinery required. This is a global issue as it depletes the resources of the planet, as well as causing high output of GHGs.

~~The manufacturing process produces~~

The issues with creating a fair clear and unbiased LCA with regards to the Sourcing of raw materials is that the exact emission outputs are not measured directly, and they must be estimated. The impact to the planet's resources however can be measured, as the amount of raw material removed from the planet can be directly measured.

The issues with creating a clear and unbiased LCA with regards to the manufacturing process of the vehicle is that the manufacturing process varies between country/and per vehicle. Therefore vehicles manufactured in more developed countries will tend towards having a lower environmental impact than those made in less efficient plants.

The issues with creating a clear and unbiased LCA with regards to the lifetime emission output of the vehicle is the usage and driving characteristics of the driver will vary greatly which creates an issue as not all drivers drive the vehicle where it is most efficient. Likewise the fuel usage of each individual vehicle can vary greatly from driver to

to drivers, not allowing for accurate estimations to be made. ✓

The end of life disposal provides issues with regard to the LCA as some cars may be more recoverable than others, e.g. when the ATF (After Treatment Facility) removes the fluid from the vehicle, some may have been drained irresponsibly prior to arrival at the ATF. ✓

- b) The target of reuse and recovery ⁹⁵ was set to ~~85~~ ⁹⁵%, meaning that ~~85~~ ⁹⁵% of the vehicle must be able to be re-used, or recovered. This creates additional costs for the vehicle manufacturers, as they have to design the vehicle with this in mind, with regards to the ~~materials~~ materials chosen for production. This will include the use of re-cycled steel, aluminium and the reuse of thermoplastics in the production of new vehicles. ✓

The target set for the re-use and recycling was 85%, meaning that 85% of the vehicle must be able to be re-used or recycled. This provides an issue for the vehicle manufacturers as it can often be more costly to utilise materials such as thermoplastics as opposed to thermosets. Like with aluminium it is often more expensive to get higher grade re-cycled aluminium than lower, as well as aluminium that is recycled is never as high a grade as the original material was. ✓

3 a) Local Councils can issue 'noise nuisance' orders to ~~any~~ the offending race track that exceeds a pre-determined noise limit, which is often agreed upon in meeting between the Council and race track owners. The local Council can ~~order~~ ^{issue} noise abatement orders to the offending track, this can result in anything from a fine, to the race track having to be shut down due to ~~too~~ too many noise complaints.

b) In the case of brand hatch, the owners have introduced a range of control measures to aid in ~~reducing~~ their noise impact. These include limiting track time to Friday and Saturday between the hours of 9-6:30am and 10-6:30pm on Sunday, with no engines to be started before 9AM.

They have agreed on the following ^{Static} noise limits, with ~~regards~~ regards to the local Council of Class 1 being limited to 105db, class 2 being limited to 118db, and class 3 being unrestricted. After each class has raced, there must be at least a day's break until the next race class can compete. The drive by noise limit is 92db and is measured from a point, 20m from the track and at 2m elevation. The Static noise measurement ~~was~~ is taken at 0.5m distance, 0.5m elevation at 45° to the exhaust tip, ~~while~~ while the vehicle is at $\frac{3}{4}$ max engine speed.

Donnington Park ~~is~~ also governed by MSU, the same body that oversees brand hatch. Donnington Park is limited to just 60 days of racing per year. 20 of those days are for class 1 vehicles with a ~~no~~ static noise limit of 108db, another 20 days for class 2 vehicles with a static noise limit of 118db, and a final 20 days of class 3 unsilenced vehicles.

Nick

Rallying is also restricted, to just 2 days per year with a static noise limit of 60 db. The drive by noise limit for Donnington Park is 98 db, with the drive by measurement point being 20m from the track, 2m elevation. The static measurements are also taken 0.5m distance, 0.5m elevation and 45° from the exhaust. Donnington also observes a day break between any classed races and limits testing to just 2 days per week.

Similar to that of Brands Hatch, Donnington also restricts racing to Friday and Saturday 9-6:30 and 10-6:30 on Sundays.

Question No.

Examiner

Arholwr yn unig

Y Cwestiwn

Question No.

Examiner Q

Arholwr yn unig

y Cwestiwn

Question No.

Examiner Only

Arholwr yn u

Rhif y Cwestiwn

Question No.

Examiner C

Arholwr yn unig.

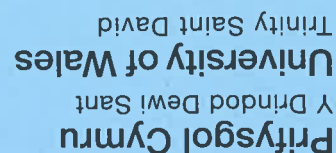
Y Cwestiwn

Question No.

Examiner

Arholwr yn unig

Cwestiwn



12 Judalen

1. Rhwch yr holl wybodaeth y gofynnir amdani yn y blychau isod.
2. Rhwch eich enw yn y lle a ddarparwyd ar y dde, plynwch et a'i selio i lawr (gan ddefnyddio'r label a ddarparwyd) i guddio'ch enw.

3. Rhaid i'r atebion fod mewn llawysgriften ddarlennadwy. Gall yr Arholwyr naill ai anwybyddu sgrïpt annarllennadwy, neu drefnu iddi gael ei theipio a chael yr ymgeisydd i dalu.

4. Ysgriennwch eich atebion i mewn linc.

5. Dechreuwch bob ateb ar dudalen newydd. Gwnewch unrhyw tras nodiadau yn y llyfr atebion a thynnu llinell drwyddynt.

6. Ni ddylid rhwgo unrhyw ran o'r llyfr hwn; rhaid ei gyflwyno yn gyfan.

7. Os deinyddir mwy nag un llytr, rhwymwch hwy gyda'i gilydd gan ddeinyddio'r tagiau sydd ar gael oddi wrth y gwyliwtr/gwylywtr.

8. Rhaid dychwelyd pob llyfr: Ni chaniateir mynd â llyfrau atebion, wedi eu defnyddio neu heb eu defnyddio, allan o'r lleoliad arthol o dan unrhyw amgylchiadau.

1	Rhif Myfyriwr	
2	Teitl y Papur	Arholiad
3	Cod y Modwl	
4	Dyddiad ac Amser yr	Arholiad
5	Lleoliad yr Arholiad	
6	Rhif Sedd	
7	Nifer y Llyfrau Atebion a gyflwynwyd	

[illegible]

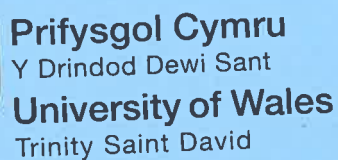
(See the other side for English version)

Llenwch, plygwch a selwch
(gweler nodyn 2 isod)

CYFENN:

ENW(AU) CYNTAF:

ENW(AU) CYNTAF:



Complete, fold and seal
(see note 2 below)

JRNAME: Salathiel

FORENAME(S): Daniel

Examination Answer Books

12 Pages

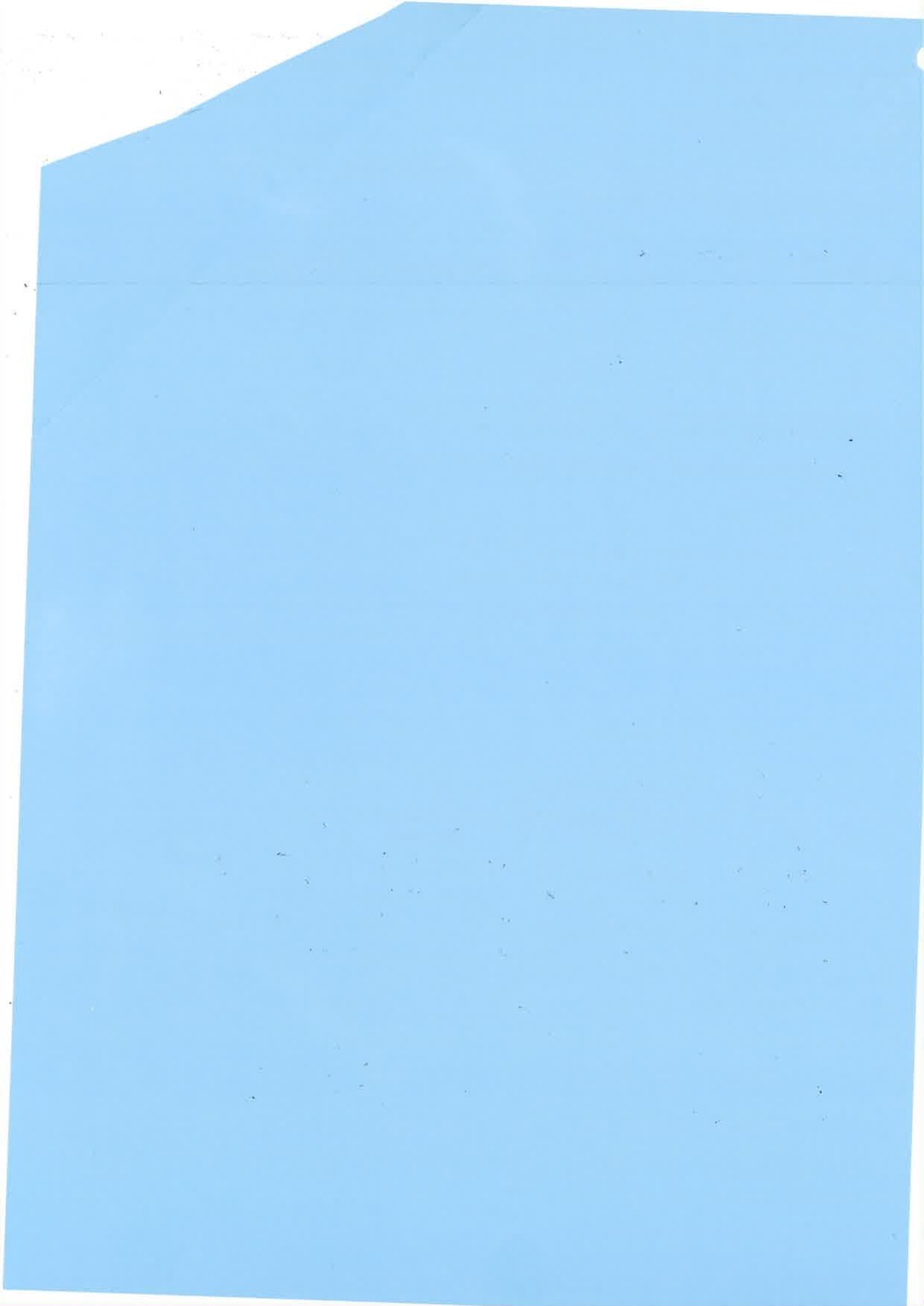
Instructions to Candidates

1. Please give the information requested in the boxes below.
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1	Student Number	P149609
2	Title of Examination Paper	sustainability through technology
3	Module Code	M6202212
4	Date and Time of Examination	16/05/2019
5	Examination Venue	102310
6	Seat Number	G061
7	Number of Answer Books handed in	1

[illegible]

Excellent.
Mark agreed
SS



Q2

a)

Raw materials processing: ✓

- Issues can arise when finding information for the sourced material and where it comes from, if its sourced from countries with no form of record methods or legislation. One such country would be a 3rd world example. ✓
- quality / quantity can be hard to find out if sourced from countries with no or little record systems. ✓

Manufacturing process: ✓

- Issues faced due to car manufacturers not wanting to share information about their processes or technology. Competitive markets may be closed doors when it comes to information regarding new vehicles.
- Information given by manufacturers may be altered or manipulated to improve their perception by the public. This will lead to inaccuracies within the LCA assessment.



- Out sourced parts from companies might be hard to trace. Problems from other countries domestic markets sharing the relevant information may cause hindrance to an accurate LCA.

Use stage of Vehicle :

- Issues may arise with knowing what duty cycle to use for the vehicles operation. This may cause issues with the accuracy of findings.
- Gathering the relevant user information target market will effect the accuracy due to different uses of the vehicle and maintenance leading to varying life periods

Disposal / Recycling stage (end of life stage).

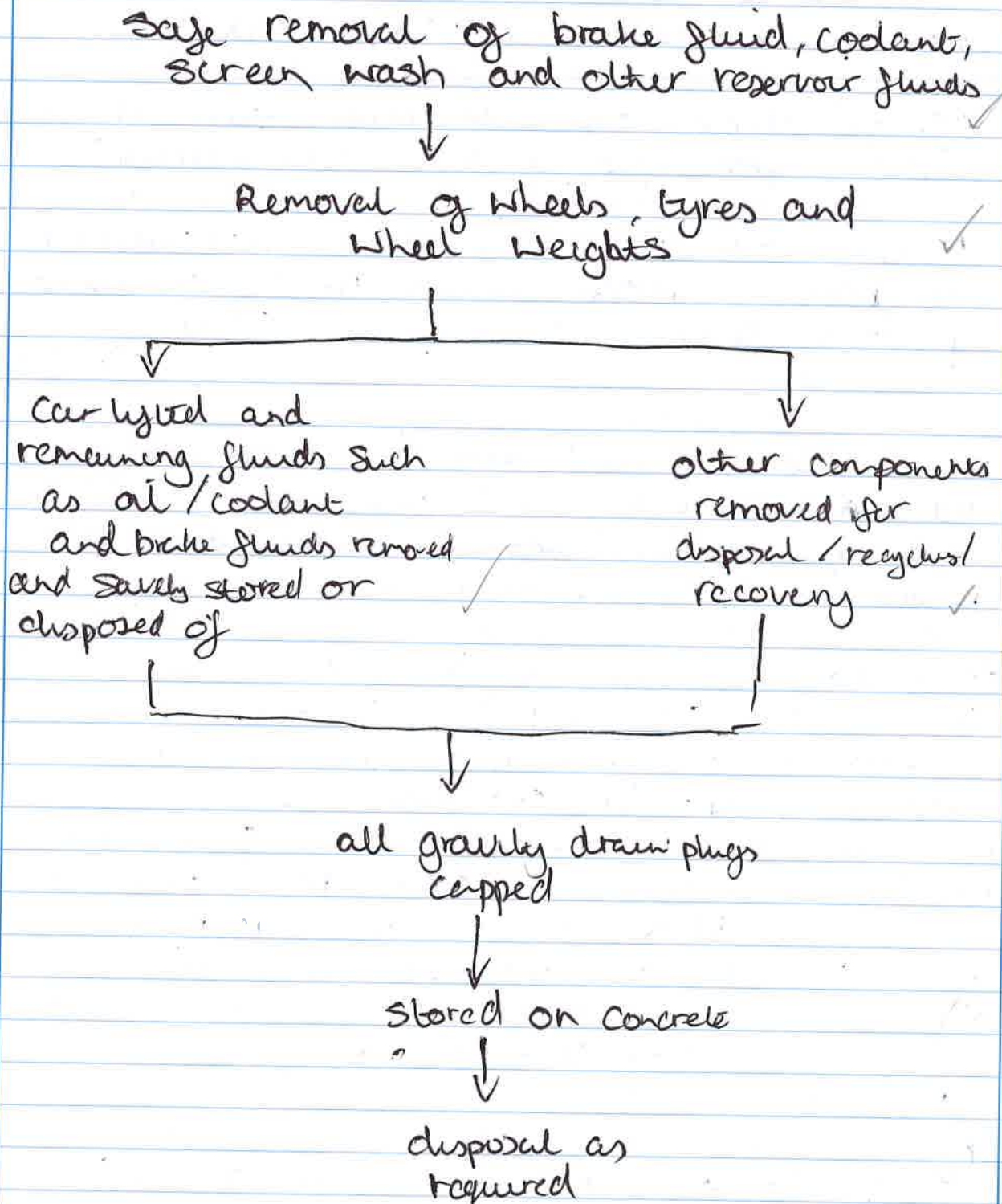
- Gathering a list of all the materials used within the vehicle may prove difficult.
- use of hybrid materials may cause issues with the percentage that can be recycled.
- Finding technical information from manufacturers to aid in scrapping or recycling may prove difficult.
- Finding a manufacturing plan for disassembly might be difficult due to communications with manufacturers.
- Different areas / locations may have varied plans / legislation for the process.

15

2d) The end of life directive was implemented to improve the industries efforts to create a more sustainable and continuous vehicle. The legislation set in 2010 served to reuse and recover 95% within the industry, and reuse and recycle 85%. Part of the process was to increase the efficiency of the scrapping and recycling of the vehicle and its components at the end of life stage.

This meant that places with the relevant permits, conforming to the legislation were setup. The owner of a vehicle being disposed of by one of these sites will need a certificate of destruction once the process has been completed.

The legislation sets out a process as followed;



The process allows for all parts of the vehicle to either be safely disposed of,

recycled or recovered.

If recovered, these parts can be reconditioned and used on the current used market cars, opening up an opportunity for the industry to resupply OEM reconditioned parts such as ABS modules, brake calipers and many other parts included. These parts help to reduce the waste that would otherwise be discarded, and reduce the need for use of new materials to produce parts stores for vehicle repairs, instead using and recycling reconditioned parts.

The end of life directive was implemented to future proof the industry and protect the environment from potential hazards posed by the materials required to manufacture a car. Threats such as lead, mercury and other hazards banned by the legislation COSHH, the control of substances hazardous to health, and the environment protection act 2 1990. This means the directive not only increases sustainable ways to reduce the waste of the automotive industry but reduces the risk it poses to health and the environment.

(24)

AS.

Q3

- a) The legislation that can be used by the Councils include abatement notices which can be imposed on a circuit with immediate effect. This requires the circuit to either cease operation, or implement a noise reduction plan constructed by the relevant authoritative bodies. Legislation can be used by the Council as follows;

Reduction of pollution Act 1974 - Where a company or business, in this case a circuit has to conform.

The act ~~states~~ and covers business / leisure / personal and controls noise pollution from personal sound systems, businesses such as pubs and noise produced by motor vehicles (not traffic). This act gives the Council and relevant bodies to act upon noises classed as a nuisance.

The Health and Safety Act 1974 -

An individual or business personally has the responsibility to ensure the safety and well being of themselves, and others around them.

The Councils can use this act to ensure

The circuit upholds its responsibility to ensure the safety and wellbeing of the visitors to site, and the surrounding population in relation to their wellbeing. A noise perceived as affecting the wellbeing of the local population can be acted on using this act. ✓

Town and Country planning act 1990 ✓

This act can be used as a preventive measure for new circuits. The act allows the councils to put in place certain perimeters in relation to the noise permitted, which has to be conformed to if the circuit is built or extended. ✓

This act protects mainly tranquil 'quiet' zones deemed by the council as protected areas. Once one such area includes the land around Castle combe circuit. ✓

Environmental protection legislation 1990 ✓

The responsibility for protection of the environment falls on circuits, meaning noise reduction plans must be implemented and enforced by councils. ✓

A noise measuring system must be used, with the information readily available to the council. If exceeded, the council will deploy an abatement notice on the circuit. ✓

Q3
D)

Circuits such as Brands Hatch, Donington and Castle Combe have all implemented noise reduction plans to help reduce their emissions and increase sustainability.

Brands Hatch has used a drive by noise restriction of 98 dBA for their Indie Circuit a 105 dBA noise limit is in place during the day, falling to 102 dBA during an evening. The 102 dBA also applies for the Grand prix Circuit.

The use of noise measurement is used to control the different class cars on track to reduce their noise impact. Any vehicle not conforming will be black flagged and not allowed to rejoin the event.

The Circuit has also used the use of permanent structures such as trees surrounding the valley the track sits in. This helps absorb some of the noise and contains it within the track boundaries.

Events have a 2 day window for no track activity after a loud event such as

noise GP, or a 1 day gap after moderate events such as BTCC events.

Donnington race circuit also use noise measuring systems to reduce their noise impact. Their drive by locations require 98 dBA. The plan separates 60 days of racing into 3 categories;

20 days of at 118 dBA	} static measurements by bodies.
20 days at 108 dBA	
20 days of unsilenced racing	

The circuit also only has 2 days for rally events at 100 dBA, with breaks between 12pm-2pm for 1 hour.

Alongside these ~~two~~ ^{three} tracks using sound measurement. They also use an online information system to inform local residence of events with the relevant noise restriction. Donnington only allows for 20 days of events over 100,000 people to reduce the noise pollution for the locals from traffic and the track.

All three circuits use an online and telephone complaint hotline to allow for recording of complaints to be logged and addressed, which is connected to the Councils database and has to be acted on within 48 hours of receiving.

All three circuits use berm embankments to deflect noise back into the circuits.

This means that the sound is reflected and impacts the environment surrounding it less. The use of woodland is also used to absorb the noise. These measures all together are efficient at reducing the noise pollution from a circuit. Factors such as wind direction and temperatures can all effect the noise emitted. But as long as the measures discussed are utilised, and good public relation is maintained, a circuit can continue to actively reduce their noise pollution.

Question No.

Examiner O

Arholwr yn unig

y Cwestiwn

