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MARKSCHEME

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INFORMATION TECHNOLOGY IN A GLOBAL SOCIETY

Higher Level

Paper 2

15 pages

Area of impact: Business and employment / Science and environment

1. (a) Describe *two* sensors that could be used to collect the data needed by the system in the car. ***[4 marks]***

*Award **[1 mark]** for each sensor that is clearly identified up to a maximum of **[2 marks]**.*
*Award **[1 additional mark]** for a description of the sensor up to a maximum of **[2 additional marks]**.*

Answers may include:

- A sensor is attached to the brake to determine the force applied to the brake ***[1 mark]*** *plus description/examples* (*e.g.* determine if the driver applies braking actions that are different from braking actions used in normal driving) ***[1 additional mark]***.
- A sensor on the speedometer to determine if the car exceeds a set speed ***[1 mark]*** *plus description/examples* (*e.g.* to determine the point in time when the driver goes over the maximum speed limit, to determine when the driver uses fast acceleration) ***[1 additional mark]***.
- A sensor is attached to steering mechanism to detect cornering/sharp turns ***[1 mark]*** *plus description/examples* (*e.g.* which are different from what would be expected in normal driving) ***[1 additional mark]***.

Reward other acceptable answers with the approval of your team leader.

(b) Explain *two* different situations, in which people's actions may be monitored using IT. In your explanation, clearly identify the situation, how IT is used in the situation and the reason for the monitoring. ***[6 marks]***

*Award **[1 mark]** for each situation that is identified including what is being monitored, up to a maximum of **[2 marks]**.*

*Award [1 **mark]** for identifying how IT is used in the situation up to a maximum of **[2 marks]**.*

*Award [1 **mark]** for identifying the reason for monitoring up to a maximum of **[2 marks]**.*

Answers may include:

- video cameras are placed along major highways to calculate and record the speed of vehicles ***[1 mark]*** *plus description/examples* (*e.g.* a computer calculates the speed and sends fines to the owner of the speeding vehicle) ***[1 additional mark]***, *plus additional explanation e.g.* (vehicles are monitored to detect/prosecute speeding drivers) ***[1 additional mark]***.
- cars are equipped with car-tracking devices *e.g.* GPS ***[1 mark]*** *plus description/examples (e.g.* a constant signal is sent from the GPS system in the car to determine its location) ***[1 mark]*** *plus additional explanation (e.g.* this could be used to track the location of stolen vehicles) ***[1 mark]***.
- a manager can remotely view an employee's monitor ***[1 mark]*** *plus description/examples* (*e.g.* this could be done using network software which is loaded onto the employee's workstation and allows viewing from the manager's computer) ***[1 mark]*** *plus additional explanation e.g.* the monitoring could be used to detect misuse of the network *e.g.* downloading inappropriate software/playing games during work hours ***[1 mark]***.

- a manager could record the websites accessed by an employee ***[1 mark]*** *plus description/examples* (*e.g.* the server could record logon ID, time, date and URL of sites visited ***[1 mark]*** *plus additional explanation* (*e.g.* the manager wants to ensure that the employee is only engaging in work related activities) ***[1 mark]***.
- a manager records the keystrokes of employees ***[1 mark]*** *plus description/examples* (*e.g* software is used to calculate the keystroke rate over a certain time [1 mark] *plus additional explanation* (*e.g.* this could be used to calculate an employee's efficiency/produce statistical analysis of work rates) ***[1 mark]***.
- an employer could monitor employees' emails ***[1 mark]*** *plus description/examples* (*e.g.* software could be used to do keyword matches with email stored on the mail server using words such as sex ***[1 mark]*** *plus additional explanation* (*e.g.* this could be done in order to stop employees sending offensive/unsuitable emails to colleagues which could be construed as harassment ***[1 mark]***.
- children's whereabouts could be tracked using their cell phones ***[1 mark]*** *plus description/examples* (*e.g.* cell phones equipped with GPS send a constant signal from the GPS to determine its location ***[1 mark]*** *plus additional explanation* (*e.g.* this is used from safety so a parent knows the child's location/a child who is lost can be tracked ***[1 mark]***.
- employers can monitor their employees' movements in a building ***[1 mark]*** *plus description/examples* (*e.g.* an employee is issued with a personal smart card which is read to gain entrance to offices and the employee's details are stored when the card is scanned ***[1 mark]*** *plus additional explanation* (*e.g.* this alerts the employer if an employee is entering an unauthorised area ***[1 mark]***.

Do not award non-IT monitoring systems (i.e. video surveillance systems)
Reward other acceptable answers with the approval of your team leader.

(c) A Government has decided to make the installation of vehicle monitoring systems compulsory. Discuss the extent to which this impacts on individual freedom. Evaluate your answers. ***[10 marks]***

Award up to ***[4 marks]*** *for each concern discussed* ***[up to a maximum of 8 marks]***
- identify ***[1 mark]***
- description/example ***[1 mark]***
- expansion/new level ***[1 mark]***
- opinion/argument/adv/disadv ***[1 mark]***

Therefore:
2 concerns fully discussed would score ***[8 marks]***.
3 concerns would probably not each be fully discussed but could total ***[8 marks]***.

Award up to ***[3 marks]*** *for evaluation.*

Award a maximum of ***[10 marks]***.

Answers may include:

- This will impact on individual freedom if the individual is unaware of **how the vehicle monitoring will be used.** Information is needed on legal actions that can result from violations and how the information will be used in accident incidents. This could be addressed by passing a government law, which indicates the details of the type of vehicle monitoring and how it will be implemented to monitor the driving of individuals. This will work provided appropriate penalties are put in place. Car companies that install the systems in new cars must make the new owner aware that they are installed.
- This will impact on the freedom of the individual if the driver does not know **what information is being collected and stored.** Concerns may include how the driver is linked to the data. This could be addressed by informing individuals about the collection of data and allowing them access to information that is stored about them in the database. This will only work if drivers are aware of their rights to access their data.
- This will impact on the freedom of the individual if **security** measures are not in place to ensure that individual's personal information is kept private and secure within the limits of current data protect legislation. Only persons authorised to use the information should have access. Data should only be passed on to third parties with the driver's consent. Measures to protect data include levels of passwords to access the database and a firewall to protect the data from external unauthorised access. This would be a good solution along with government policies to ensure protection is sufficient and passwords are kept strictly confidential.
- This will impact on the freedom of the individual if they do not have access to data stored about them. The government needs to confirm with individuals what data has been collected about them. Individual **should have the right to see the data** that has been collected and stored about them, individuals should be able to download the data to their home computer. Government will need to make certain that the data collected relates to particular drivers.

Evaluation or weighing up of arguments may include:

- evaluation of the impact of each advantage on the stakeholders
- comparisons between issues (apportioning priority)
- short term and long term comparisons and evaluation
- long range impact of the issues and evaluation
- an appraisal based on the arguments.

Reward other acceptable answers with the approval of your team leader.

Area of impact: Health

2. (a) Identify *two* ways IT can be used to provide medical advice and information directly to people. ***[2 marks]***

*Award **[1 mark]** for each type of information technology that is clearly identified up to a maximum of **[2 marks]**.*

Answers may include:

- medical websites
- medical CD-ROMs
- medical information accessible through Digital TV
- cellular phones that provide access to online medical/services
- e-mail to doctor
- VoIP communication with doctor
- medical expert system
- chat room with medical specialist
- video conference with medical expert.

Reward other acceptable answers with the approval of your team leader.

(b) A person thinks that he may have a disease called "Fibromyalgia". Describe *two* ways in which IT-based resources may be helpful to this person. ***[4 marks]***

*Award **[1 mark]** for each way that is identified up to a maximum of **[2 marks]**.*
*Award **[1 additional mark]** for the description of how each IT-based resource may be helpful to this person up to a maximum of **[2 additional marks]**.*

Answers may include:

- Individuals can be informed of specific information about Fibromyalgia/symptoms/how to get help and from online medical sources ***[1 mark]*** *plus description/examples* (*e.g.* by searching online for details of symptoms to determine if they have the disease/by searching for specialists in the area that they could contact) **or** (*e.g.* individuals may experience symptoms and try to determine if they have the illness, they wish to find the contact details of a Fibromyalgia specialist) ***[1 additional mark]***.
- Individuals can consult online information about treatments for Fibromyalgia ***[1 mark]*** *plus description/examples* (*e.g.* accessing online dietary information, medical details regarding medicine for Fibromyalgia from recognized online medical services) ***[1 additional mark]***.
- The individual may contact online patient user groups for Fibromyalgia ***[1 mark]*** *plus description/examples* (*e.g.* the individual may post questions to the group and receive responses) **or** (*e.g.* user groups may know of new sources of help or medication for the illness, user groups can provide emotional support for coping with Fibromyalgia) ***[1 additional mark]***.

Reward other acceptable answers with the approval of your team leader.

(c) Describe *two* advantages of an IT medical system compared to direct consultation with a doctor. ***[4 marks]***

*Award **[1 mark]** for each advantage that is identified up to a maximum of **[2 marks]**.*
*Award **[1 additional mark]** for describing how an IT medical system is an advantage compared to direct consultation with a doctor up to a maximum of **[2 additional marks]**.*

Answers may include:

- IT can provide an opportunity for people to access advice on a more anonymous basis than visiting a doctor ***[1 mark]*** *plus description/examples* (*e.g.* people do not want their family doctor to know/they are afraid the family doctor will share the sensitive or embarrassing information with family members or others in the community) ***[1 additional mark]***.
- Inconvenient or not possible for employees to visit a doctor and they can consult the Internet whenever they want ***[1 mark]*** *plus description/examples* (*e.g.* location of the doctor is inconvenient, office hours are not suitable, doctors office hours are not compatible with the study/work hours of person, "24 hours a day/7 days a week" access to web medical information) ***[1 additional mark]***.
- Internet medical services are perceived as providing an authoritative/ unbiased/comprehensive source compared with the doctor ***[1 mark]*** *plus description/examples* (*e.g.* the doctor may not have seen the disease before/can't diagnose it) ***[1 additional mark]***.
- The Web may provide a clearer/fuller explanation than a doctor ***[1 mark]*** *plus description/examples* (*e.g.* information can be repeatedly accessed/comparison of medical information between online sources is possible/additional links may be provided to further information) ***[1 additional mark]***.
- Cost saving as there is no doctor's fee ***[1 mark]*** *plus description/examples* (*e.g.* medical websites are usually free/no travel cost and lost income.

Reward other acceptable answers with the approval of your team leader.

(d) Many people are reluctant to use IT-based advice instead of advice direct from doctors. Discuss the concerns that they may have. Evaluate these concerns. ***[10 marks]***

Award up to ***[4 marks]*** *for each concern discussed* ***[up to a maximum of 8 marks]***
- *identify* ***[1 mark]***
- *description/example* ***[1 mark]***
- *expansion/new level* ***[1 mark]***
- *opinion/argument/adv/disadv* ***[1 mark]***

Therefore:
2 concerns fully discussed would score ***[8 marks].***
3 concerns would probably not each be fully discussed but could total ***[8 marks].***

Award up to ***[3 marks]*** *for evaluation.*
Award a maximum of ***[10 marks]****.*

- A person may be concerned about the **accuracy** of the site. Anyone can publish a Web site. There is concern that a serious illness is not correctly diagnosed by an online IT medical service. Patients have more confidence in the advice from a doctor. Doctors can send the patient for additional diagnostic tests. Family doctors know a patient's medical history.
- The person feels that the illness requires personal or reassuring advice that an experienced doctor could give. **Personal counselling** and advice not available on web-based medical sites. Doctors can take more circumstances into consideration, such as illnesses that have occurred in previous generations in the family, additional symptoms undetected by the patient.
- The person is concerned that the information on the IT-based system (online, CD-ROM) may not be the most **current** information. Some websites do not have any indication of when the information was last updated or who is responsible for the information. The person does not have confidence in an IT-based system where no one seems responsible or accountable for the information being up-to-date.
- There are concerns about the **privacy** of search terms. The search details may be stored and become available to third parties.
- There is a concern about **authenticity** of 'medical experts' in chat rooms/forums. How does the person know if the 'medical expert' is authentic?
- A person may not have the medical knowledge to type in the correct symptoms/interpret the advice given by an IT system. When visiting a doctor the patient can ask for clarification and the doctor can answer questions and interpret medical jargon.
- The patient may not understand advice from the Internet due to technical terms. A doctor can interpret jargon and answer patient queries.

Evaluation or weighing up of arguments may include:
- evaluation of the impact of each concern of the people seeking advice
- comparisons between concerns (apportioning priority)
- short term and long term comparison and evaluation
- long range impact of the concerns and evaluation
- an appraisal based on the arguments.

Reward other acceptable answers with the approval of your team leader.

Area of impact: Business and employment

3. (a) Identify *two* ways in which PDAs can communicate with computer systems. ***[2 marks]***

*Award **[1 mark]** for a way that is clearly identified up to a maximum of **[2 marks]**.*

Answers may include:

- WiFi
- infrared
- interface cables
- Bluetooth
- a docking device.

Reward other acceptable answers with the approval of your team leader.

(b) The term "convergence" is used to describe instances where different mobile digital devices are combined to produce one new product. Describe *two* new products where the features from different mobile digital devices are combined. ***[4 marks]***

*Award **[1 mark]** for each example of convergence that is clearly identified up to a maximum of **[2 marks]**.*
*Award **[1 additional mark]** for a description of features used in the convergence to a maximum of **[2 additional marks]**.*

Answers may include:

- New mobile phones created from the convergence of current mobile phone technology and PDAs ***[1 mark]*** *plus description/examples* (*e.g.* features such as address books, diary and games from PDAs are included in the mobile phone) ***[1 additional mark]***.
- New cameras created from current digital camera technology and the communications capabilities from mobile phones ***[1 mark]*** *plus description/examples* (*e.g.* allows the user to take high quality photographs and send via MMS, email attachment or upload the file to a server) ***[1 additional mark]***.
- New laptop with mobile phone capabilities combined with laptop capabilities ***[1 mark]*** *plus description/examples* (*e.g.* user can utilise all features of computer and communicate via microphone/speaker or via Internet using mobile phone technology) ***[1 additional mark]***.
- New mobile phones created from the convergence of current mobile phone technology and music players ***[1 mark]*** *plus description/examples* (*e.g* it is now possible to store and play your favourite music as well as calling friends on the phone) ***[1 additional mark]***.
- New cameras created from current digital camera technology plus mp3 players ***[1 mark]*** *plus description/examples* (*e.g.* now it is possible to take photos and store and play your favourite music using the one device) ***[1 additional mark]***.

Reward other acceptable answers with the approval of your team leader.

(c) Some people think that PDAs will eliminate the need for people to use laptop computers. Examine this argument. ***[4 marks]***

*Award **[1 mark]** for identifying an issue/situation.*
*Award **[1 additional mark]** for a description of the issue/situation.*

Or
*Award up to **[2 marks]** for identifying more than one issue/situation (as the question does not specify how many issues).*

*Award up to **[2 additional marks]** for some critical analysis (advantages/disadvantages, reasons to agree or disagree with the argument).*

Answers may include:

- The increase in the technology in PDAs in the future will allow software that is normally on laptop computers to be included in PDAs making the need for laptop computers unnecessary ***[1 mark]*** *plus description* (*e.g.* these features include email and Internet access/software packages including word processing, spreadsheets and slideshows) ***[1 mark]***. Advantages *e.g.* PDAs are more portable and affordable than laptops. ***[1 mark]*** Disadvantages *e.g.* the small screen size makes viewing websites/word processing difficult ***[1 mark]***.
- The input capabilities of PDAs will eliminate the need for a keyboard for entering information ***[1 mark]*** *plus description* (*e.g.* advances in speech recognition and handwriting recognition systems will reduce the need for laptop computers or reduce the laptop to a PDA) ***[1 mark]***. Advantages *e.g.* PDAs are smaller and portable ***[1 mark]*** but limitations *e.g.* speech recognition and handwriting recognition require user training ***[1 mark]***.
- All work files will be stored on company servers with PDAs having quick remote access ***[1 mark]*** *plus description* (*e.g.* this is due to advances in technology such as Internet/increased bandwidth/PDA technologies) ***[1 mark]***. Advantages *e.g.* the portability for workers/travellers ***[1 mark]*** compared with carrying a laptop which is cumbersome for travellers/labourers ***[1 mark]***.
- PDAs will have increased speed, memory and storage capabilities that will enable them to perform the same functions as laptop computers ***[1 mark]*** *plus description* (*e.g.* advances in sound, imaging and video capabilities on PDAs) ***[1 mark]***. Advantages *e.g.* this is a big cost saving with similar functionality at a lower price ***[1 mark]***. Disadvantages are screen size which limits viewing images and video ***[1 mark]***.
- It is unlikely that PDAs will eliminate laptops. PDAs have the basic software of a laptop and can act as an organiser ***[1 mark]*** however it does not have the functionality to run large graphics applications *e.g.* Adobe Flash ***[1 mark]***. There is also the fact that the screen of the PDA is small and it has a touch screen for input rather than a keyboard ***[1 mark]***. Unlike a laptop the small screen and lack of keyboard can result in the user working in a hunched up position and this could lead to bad ergonomics and RSI ***[1 mark]***.
- PDAs are preferred by many people due to their small size and portability ***[1 mark]***. Mobile workers can easily carry them around in their pocket or handbag whereas laptops are much heavier/more bulky ***[1 mark]***.

Reward other acceptable answers with the approval of your team leader.

(d) Discuss the advantages of multi function PDA equipment to businesses and their employees. Evaluate these advantages. ***[10 marks]***

Award up to ***[4 marks]*** *for each advantage discussed* ***[up to a maximum of 8 marks]***
- identify ***[1 mark]***
- description/example ***[1 mark]***
- expansion/new level ***[1 mark]***
- opinion/argument/adv/disadv ***[1 mark]***

Therefore:
2 advantages fully discussed would score ***[8 marks]****.*
3 advantages would probably not each be fully discussed but could total ***[8 marks]****.*

Award up to ***[3 marks]*** *for evaluation.*
Award a maximum of ***[10 marks]****.*

Answers may include:

- Employees are constantly available via mobile to the employer. Companies can expect employees to be contactable whenever they are out of the office, easy to keep employees informed of current developments within the company. There is no danger of missed calls from prospective clients, employees can conduct business at anytime anywhere.
- Employees can use using photographic capabilities of mobile digital devices to relay images back to the company**.** Employees can immediately take photos relevant to a development and send them to the company. The immediate access to images may facilitate the understanding in a phone conversation to someone in the company, provide company advantage in a business situation.
- Employees can synchronize their time planner with the company time planner. Employees can frequently update their calendar with the company time planner so that time schedules for employees are available to everyone in the company. The availability of persons for particular jobs is always accessible, increases productivity within the company.
- There is a cost saving for the business as PDAs are cheaper than computers. Computers are expensive and maintenance costs can be high but PDAs are relatively inexpensive with low maintenance. There is a further cost saving as a PDA can include camera/phone so there is no need to buy separate items.
- PDAs are quite easy to use so less training would be required. This is a cost saving to the employer. Employees can also take them home to become familiar with their functions. This of course can infringe on family time and result in expectations of after hours work.
- In service industries PDAs can provide improved customer service. In a restaurant an order can be sent by wireless technology to the kitchen faster than a waiter can walk there. There are likely to be fewer errors with orders, which can easily occur in a paper based restaurant system.
- A multi-function PDA offers the convenience for the employee who has multiple functions within the one piece of equipment. This provides portable, anywhere/anytime access to phone/camera/PDA. Of course if the device is lost it means the employee loses access to all these services.

Evaluation or weighing up of arguments may include:

- evaluation of the impact of each advantage on the stakeholders
- comparisons between advantages (apportioning priority)
- short term and long term comparisons and evaluation
- long range impact of the advantages and evaluation
- an appraisal based on the arguments.

Reward other acceptable answers with the approval of your team leader.

Area of impact: Business and employment / Politics and government / Arts, entertainment and leisure

4. (a) Describe *two* ways in which, either intentionally or unintentionally, the computer chiselled copies may not be identical to the original hand-made sculpture of the lion's head. ***[4 marks]***

*Award **[1 mark]** for each way identified up to a maximum of **[2 marks]**.*
*Award **[1 additional mark]** for the description of the way the copies may be different from the original up to a maximum of **[2 additional marks]**.*

Answers may include:

- Physical materials are different so that the original material be different from the computer chiselled copy ***[1 mark]*** *plus description* (*e.g.* difference could be contributed to a human vs machine working on carving the figure) ***[1 additional mark]***.
- There could be an intentional decision to use the original scanned image in a new way ***[1 mark]*** *plus description/examples* (*e.g.* original in limestone and copy may be in red marble, change in size of the copy, artistic interpretation) ***[1 additional mark]***.
- The person making the copy may decide to fix problems that appear in the *original* ***[1 mark]*** *plus description/examples* (*e.g.* weather could have caused some deterioration that has to be repaired in the copy) ***[1 additional mark]***.
- There could be an error/malfunction in the software/hardware ***[1 mark]*** *plus description/examples* (*e.g.* resulting in a less than perfect copy – some areas are not properly scanned) ***[1 additional mark]***.

Reward other acceptable answers with the approval of your team leader.

(b) Government officials in Milan are using this technology to scan hand-carved statues in the cathedral. The US government is using this technology to scan many larger national monuments such as the Statue of Liberty, the Capitol building and Mount Rushmore.

Describe *three* reasons why government officials would want to scan national monuments and statues. ***[6 marks]***

*Award **[1 mark]** for each reason that is identified up to a maximum of **[3 marks]**.*
*Award **[1 additional mark]** for describing the reason up to a maximum of **[3 additional marks]**.*

Answers may include:

- Replacement of deteriorating or damaged sculptures (*e.g.* statues and national monuments can be damaged by pollution or natural disasters such as earthquakes or floods) ***[1 mark]*** *plus description/examples* (*e.g.* original hand-carved statues can be conserved where they will not suffer erosion and replaced by copies) ***[1 additional mark]***.
- Missing parts of buildings that are difficult to replicate can be accurately reproduced to match existing architecture/they may wish to replicate the sculpture to reproduce it elsewhere ***[1 mark]*** *plus description/examples* (*e.g.* the computer shows how the original looked and produces a replica) ***[1 additional mark]***.
- In the event of a terrorist act that destroys a statue or monument the electronic versions will still exist ***[1 mark]*** *plus description/examples* (*e.g.* damaged monuments can be reproduced from the stored scanned images) ***[1 additional mark]***.
- The Government could create a computer model using the 3D scan ***[1 mark]*** *plus description/examples* (*e.g.* this could be used to measure stress factors to ensure the sculpture is withstanding the environmental conditions) ***[1 additional mark]***.
- The Government may wish to scan a famous statue for historical purposes ***[1 mark]*** *plus description/examples* (*e.g.* this would enable them to have a digital copy for showing future generations significant sculptures) ***[1 additional mark]***.
- The Government may wish to scan a famous statue and make a small replica ***[1 mark]*** *plus description/examples* (*e.g.* an exact miniature could be made of the Eiffel Tower and sold to tourists) ***[1 additional mark]***.

Reward other acceptable answers with the approval of your team leader.

(c) Discuss how living artists and architects may be affected if laser scanning and robotic technologies are used extensively in this way. Evaluate your answers. ***[10 marks]***

Award up to ***[4 marks]*** *for each way living artists and architects may be affected is discussed* ***[up to a maximum of 8 marks]****.*

- identify ***[1 mark]***
- description/example ***[1 mark]***
- expansion/new level ***[1 mark]***
- opinion/argument/adv/disadv ***[1 mark]***

Therefore:
2 ways fully discussed would score ***[8 marks]****.*
3 ways would probably not each be fully discussed but could total ***[8 marks]****.*

Award up to ***[3 marks]*** *for evaluation.*

Award a maximum of ***[10 marks]****.*

- Use of these technologies could result in theft of intellectual property from artists and architects. Works of art can be reproduced in large numbers loss of revenue for the artist. Works of art can be made available to larger audience.
- Artists and architects may efficiently duplicate their own works of art using laser scanners and robotic chisels. Faster to produce the reproduction, possibly cheaper to produce replica with laser scanner and robotic chisel. While the robotic chisel is working, the artist can be available to work on some other work, new art forms and merchandising may emerge from having laser scans available on the computer.
- Artists benefit from becoming widely known as copies of their work are distributed. This would result in an increase in revenue for the artist due to greater promotion.
- If these technologies are used to create sculptures this threatens the jobs of artists. Computers are more reliable, faster and more accurate. Copies are cheaper. When sculptures are replicated the original diminishes in value as it is no longer unique

Evaluation may include:
- evaluation of the impacts on living artists and architects
- comparisons between impacts (apportioning priority)
- short term and long term comparisons and evaluation
- long range impact of the impacts and evaluation
- an appraisal based on the arguments.

Reward other acceptable answers with the approval of your team leader.