Command Words
Calculate

Remember:
You should **use numbers given in the question** to work out the answer.
You should always **show your working**, as it may be possible for the examiner to award some marks for the method even if the final answer is wrong.
You should always **give the units** – sometimes a mark may be awarded for the correct units, even if the calculation is wrong.

The rope is shaken up and down, producing 3 waves every second.
The waves have a wavelength of 1.2 metres.

State the frequency of the waves.

..... Hz
(1 mark)

Calculate the speed of the waves.

Use the correct equation from the Physics Equations Sheet.

Show clearly how you work out your answer.

.....

.....

Wave speed = ... m/s
(2 marks)

$v = f \times \lambda$	v speed f frequency λ wavelength

Step 1:
frequency = number of waves per second
frequency = 3 Hz

Step 2:
wave speed = frequency x wavelength
wave speed = 3 x 1.2
wave speed = 3.6 m/s

The table shows the percentages of some gases in the exhaust from a petrol engine.

Name of gas	Percentage (%)
nitrogen	68
carbon dioxide	15
carbon monoxide	1.0
oxygen	0.75
nitrogen oxides	0.24
hydrocarbons	0.005
sulfur dioxide	0.005
other gases	

What is the percentage of the other gases in the table?

.....
(1 mark)

Step 1:
Add all the given percentages
68+15+1.0+0.75+0.24+0.005+0.005
= 85%

Step 2:
Minus 85% from 100%
100-85 = 15%

Command Words
Compare

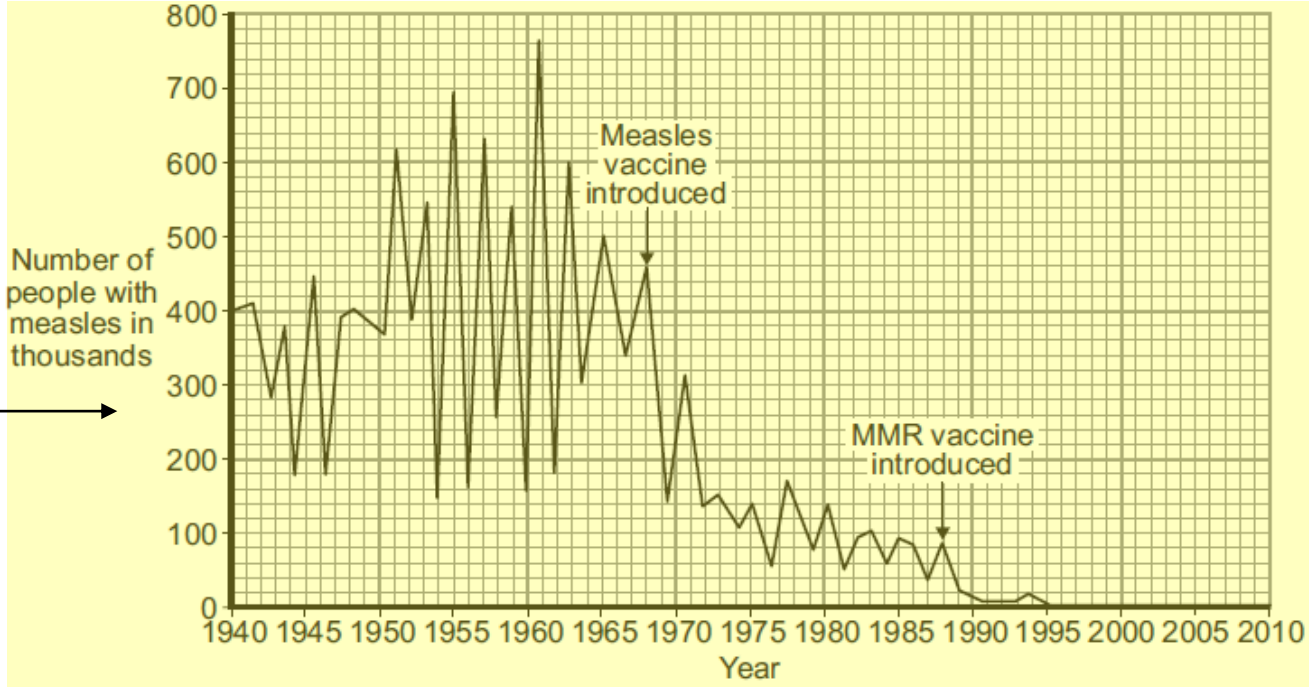
Remember:
This requires you to **describe** the **similarities** and/or **differences** between things, not just write about one.
If you are asked to “compare x with y”, you need to write down something about x **and** something about y, and should give a comparison.

Points to note:
This is a 3 mark question so it requires you to make 3 separate points.
All the information you need to answer the question is on the graph.

Step 1: Similarities
The introduction of the measles vaccine and the MMR vaccine both lead to a reduction in measles cases. (1 mark)

Step 2: Differences
The measles vaccine caused a bigger drop in measles cases than the MMR vaccine. (1 mark)
However the MRR vaccine reduced measles cases to almost zero. (1 mark)

8 The graph shows the number of people with measles in the UK between 1940 and 2010.



8 (a) Compare how effective introducing the measles vaccine was with introducing the MMR vaccine.

Use data from the graph.

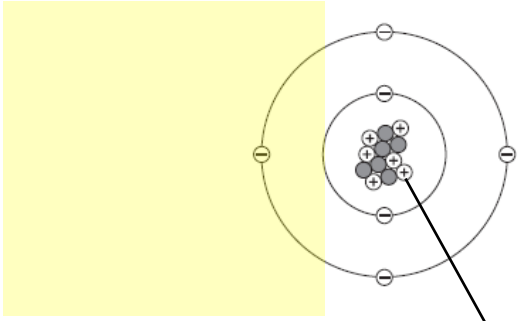
Command Words Complete

Remember:
Answers should be **written in the space provided**, eg on a diagram, in spaces in a sentence or in a table.

Step 1:
Look at the information provided

Step 2:
Use your own knowledge

Diamond is a form of carbon. The diagram represents a carbon atom.



Complete the table to show the name and charge of each type of particle in the carbon atom.

Name of particle	Charge
proton	+
neutron	0
Electron	–1

(2 marks)

Use words from the box to complete the passage about natural selection.

evolution	**environment**	**generation**
mutate	**survive**	**variation**

Individual organisms of a species may show a wide range of variation because of differences in their genes.

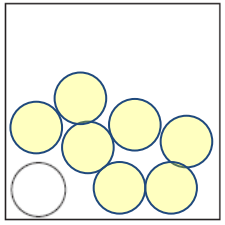
Individuals with characteristics most suited to the environment are more likely to survive and breed successfully.

The genes that have helped these individuals to survive are then passed on to the next generation.

(4 marks)

Complete the diagram below to show the arrangement of the particles in a liquid.

Liquid



From the mark scheme:
Random distribution of circles in the box with at least 50 % of circles touching
Random distribution of circles occupies more than 50 % of the space

(2 marks)

Command Words
Describe

Remember:
You should **recall** some facts, events or process in an **accurate** way - for example an experiment you have done.
You may need to **give an account** of what something looked like, or what happened, eg a trend in some data.

Information:
This question gives you all the information you need to answer the question

Cement is made by heating a mixture of clay and limestone in a kiln.

Many kilns are heated by burning natural gas (methane) in air.

A chemical equation for the burning of methane is:

$$CH_4 + 2O_2 \rightarrow 2H_2O + CO_2$$

Describe this reaction in words.

Give the names of the molecules **and** the numbers of each molecule in this chemical equation.

Step 1: Reactants
One molecule of methane reacts with two molecules of oxygen to give… (1 mark)

Step 2: Products
... two molecules of water and one molecule of carbon dioxide (1 mark)

(2 marks)

To immunise someone against measles, a small quantity of the inactive measles pathogen is injected into the body.

Describe what happens in the body after immunisation to stop a person catching measles in the future.

Information:
This is a 3 mark question so it requires you to make 3 separate points.
This question requires you to recall the process that happens in the body after an immunisation.

Point 1: First response
The body releases white blood cells to attack the inactive measles pathogen. (1 mark)

Point 2: Antibodies
The white blood cells then produce antibodies specific to the measles pathogen in order to destroy it. (1mark

Point 3: Immune response
If the body becomes re-infected with the measles pathogen it can quickly produce the required antibody. (1 mark)

(3 marks)

Command Words
Evaluate

Remember:
You should use the **information supplied** or your **own knowledge and understanding** to consider the **evidence for and against** and draw **conclusions**.
This goes further than "compare". For example, you may be given a passage to read and told to "Evaluate the benefits of using system x and system y". This means you will need to write down some of the pros and cons for both systems, **AND** then state which one is better and why.
You should complete your answer with a conclusion.

Step 1: Pros
The LED is more cost effective because for 50,000 hours only one LED bulb is required compared to 5 CFL's. (1 mark)

Step 2: Cons
However for 50,000 hours the CFL bulbs would cost £15.50 compared to £29.85 for the LED bulb (1 mark)

Step 2: Conclusion
In conclusion because the LED bulb is 15% more efficient than the CFL bulb it will cost less to run during its life time making it the most cost efficient bulb, even when the cost of one bulb is taken into account. (1 mark)

Only two of the above points are required for the marks in this example. However it is good practice to always write the pros, cons and a conclusion for every evaluate question.

The table gives data about two types of low energy bulb.

Type of bulb	Power input in watts	Efficiency	Lifetime in hours	Cost of one bulb
Compact Fluorescent Lamp (CFL)	8	20%	10000	£3.10
Light Emitting Diode (LED)	5	35%	50000	£29.85

Use the data in the table to evaluate the cost-effectiveness of an LED bulb compared to a CFL.

Calculated earlier in the question

(2 marks)

Command Words
Explain

Remember:
Candidates should make something clear, or state the reasons for something happening.
The points in the answer **must** be linked coherently and logically.
The answer should **not** be a simple list of reasons.

Step 1: Cause
Because the amount of carbon dioxide in the atmosphere is rising due to the burning of carbon that was locked in fossil fuels…
(1 mark)

Step 2: Effect
…and carbon dioxide causes global warming because of the greenhouse effect.
(1 mark)

Examiners comments:
Many students referred to global warming, but very few mentioned that the carbon dioxide levels were increasing or that the carbon dioxide produced had been locked up in fossil fuels. A number of students also incorrectly included some reference to global dimming and/or the ozone layer in their answer.
Remember - cause and effect or this happens because - by following these steps you will ensure you get the marks.

The table shows the percentages of some gases in the exhaust from a petrol engine.

Name of gas	Percentage (%)
nitrogen	68
carbon dioxide	15
carbon monoxide	1.0
oxygen	0.75
nitrogen oxides	0.24
hydrocarbons	0.005
sulfur dioxide	0.005
other gases	15%

Many scientists are concerned about the carbon dioxide released from burning fossil fuels such as petrol.

Explain why.

.....

.....

.....

.....

(2 marks)

Command Words
State, give, name, write down

Remember:
Only a short answer is required, not an explanation or a description. Often it can be answered with a single word, phrase or sentence.
If the question asks you to state, give, or write down **one** (or **two** etc) examples, you should write down **only** the specified number of answers, or you may lose marks for any wrong examples given.
Your answers should be short, concise and to the point!

State how nitrogen oxides are produced in a petrol engine.

.....

.....

.....

.....

(2 marks)

Step 1:
Because nitrogen and oxygen are in the air and…
(1 mark)

Step 2:
…react at high temperature in the engine.
(1 mark)

Give **two** possible health effects on the child of eating so many biscuits every day.

1 .....

2 .....

(2 marks)

Any two of the following:
Overweight / obesity **or** increased BMI
(Type 2) diabetes
High blood sugar
High blood pressure
Cardiovascular / heart disease **or** heart problems **or** disease of blood vessels **or** clogged arteries
High cholesterol
Arthritis / worn joints
Tooth decay

The waves produced on the rope are transverse.

Name **one** other type of transverse wave.

.....

(1 mark)

Any of the following:
Electromagnetic wave – radio wave, microwave, infra-red, visible light, ultra violet, X-ray or gamma ray
Water wave
S waves caused by an earthquake or seismic activity

Command Words
Suggest

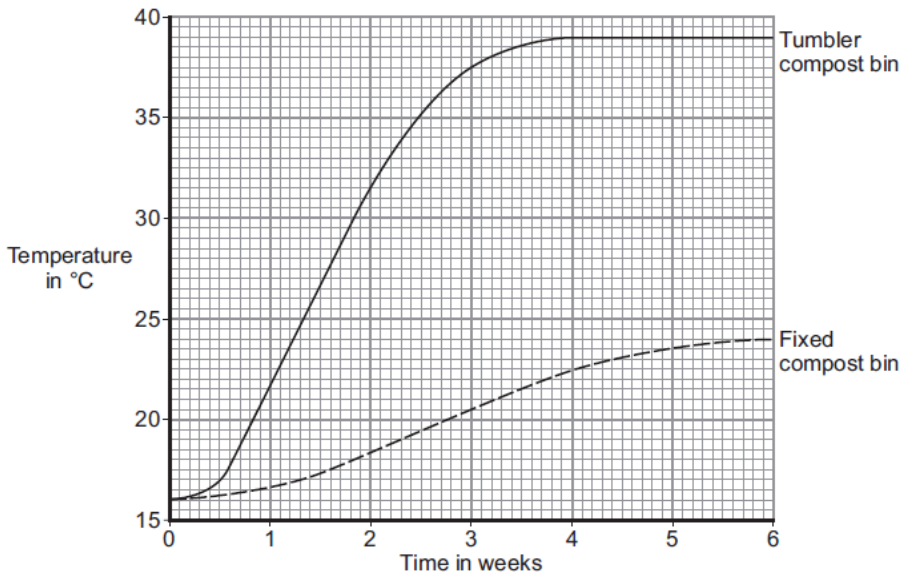
Remember:
This term is used in questions where you need to **apply** your knowledge and understanding to a **new situation**. Often there may be **more than one correct answer** as you are expected to base your answers on scientific knowledge and/or principles.

Information:
This is a 2 mark question so it requires you to make 2 separate points.
This question asks for an explanation so you need to write a cause and effect or this happens because in your answer

Suggestion 1:
Cause - faster respiration / decay / **or** microorganisms / microbes / decomposers work faster in the tumbler… (1 mark)
Effect - …so more heat produced in the tumbler (1 mark)

Suggestion 2:
Cause - more air / more oxygen(ation) in the tumbler… (1 mark)
Effect - …so more respiration / faster decay / bacteria work faster in the tumbler (1 mark)

5 (b) The same amounts of waste were added to the two types of bin.
The graph shows the temperature in the bins in the first six weeks after the waste was added.



5 (b) (iii) There was a big difference in the final temperatures in the two bins.

Suggest an explanation for this temperature difference.

.....

.....

.....

.....

(2 marks)

Command Words - Use the information in the passage/diagram/graph/table to…

Remember:
The answer **must** be based on the information given in the question.
Unless the information given in the question is used, no marks can be given.

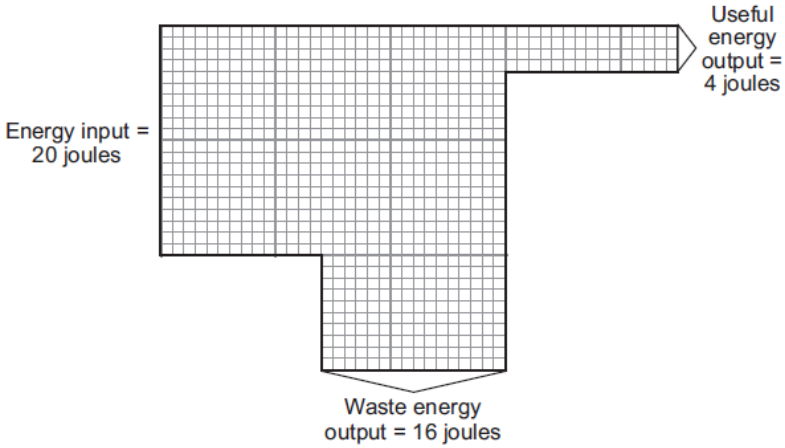
Step 1:
Find the correct equation

$$\text{efficiency} = \frac{\text{useful energy out}}{\text{total energy in}} \ (\times 100\%)$$

Step 2:
Use the information from the diagram
Efficiency = 4/20 (x100)
Give the working (1 mark)

Step 3:
Efficiency = 20%
(1 mark)

3 (a) The Sankey diagram for a low energy light bulb, known as a CFL, is shown below.



3 (a) (iii) Use the information in the diagram to calculate the efficiency of the CFL.

Use the correct equation from the Physics Equations Sheet.

Show clearly how you work out your answer.

.....

.....

.....

.....

Efficiency = ...

(2 marks)

Command Words - Use the information in the passage/diagram/graph/table to…

Remember:
The answer **must** be based on the information given in the question.
Unless the information given in the question question is used, no marks can be given.

Step 1:
Do question **6 (a) (ii)** first to give you the formula.
Look at the table, there is a pattern:

Hexane C = 6 / H = 14 (14 = 2 x 6 + 2)
Octane C = 8 / H = 18 (18 = 2 x 8 + 2)
Nonane C = 9 / H = 20 (20 = 2 x 9 + 2)
Decane C = 10 / H = 22 (22 = 2 x 10 + 2)

C_nH_{2n+2}

Step 2:
Use the formula and the information from the table to answer question **6 (a) (i)**
Hexane = 6 carbons
Octane = 8 carbons
Therefore,
Heptane = 7 carbons

C_7H_{16}

6 A mixture of petrol and air is burned in a car engine.
Petrol is a mixture of alkanes. Air is a mixture of gases.

The tables give information about the composition of petrol and the composition of air.

Petrol	
Alkane	**Formula**
hexane	C_6H_{14}
heptane	
octane	C_8H_{18}
nonane	C_9H_{20}
decane	$C_{10}H_{22}$

Air	
Gas	**Percentage (%)**
nitrogen	78
oxygen	21
carbon dioxide	0.035
Small amounts of other gases and water vapour	

6 (a) Use the information above to answer these questions.

6 (a) (i) Give the formula for heptane.

.....

(1 mark)

6 (a) (ii) Complete the general formula of alkanes.
n = number of carbon atoms

C_nH

(1 mark)

Command Words
How to approach questions

Step 1: What is the question asking?

- Calculate
- Compare
- Complete
- Describe
- Explain
- State, give, name, write down
- Use the information in the passage / diagram / graph / table to…

Step 2: What information is given?

- Numbers
- Key words
- Equations
- Key points
- Graphical data
- Data table
- Diagram
- Notes

Step 3: Check the marks

- How many?

Step 4: Write the answer

Step 5: Check the answer

- Have you answered the question?
- Have you used the given information?
- Is your answer appropriate to the number of marks?