Questions matter

Supporting ITT – Understanding GCSE Science assessment

ASE 2024

Examples and further information

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Identifying the Assessment Objectives

Example 1: GCSE Trilogy Chemistry 2H 2018

0 3 A student investigated the mass of dissolved solids in 5 cm^3 samples of water.

Figure 3 shows the apparatus.

Figure 3

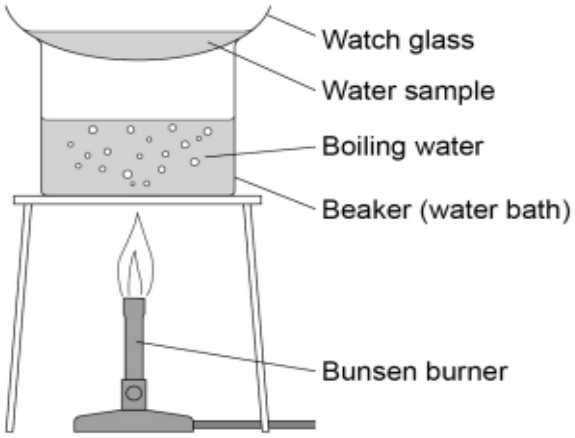


Table 2 shows the student's results.

Table 2

Type of water	Mass in g			
	Watch glass	Watch glass and dissolved solids	Dissolved solids in 5 cm^3 of water	Dissolved solids in 1000 cm^3 of water
Sea water	9.34	9.48	0.14	28.00
River water	9.15	9.23	0.08	**X**
Rainwater	8.93	8.93	0.00	0.00

0 3 . 1 Calculate mass **X** in **Table 2**

[1 mark]

Mass **X** = _____ g

0 3 . 2 5 cm^3 is a small volume of water for each experiment.

Give **one** advantage and **one** disadvantage of using a larger volume.

[2 marks]

Advantage _____

_____

Disadvantage _____

_____

0 3 . 3 Potable water is **not** pure water.

Describe the difference between potable water and pure water.

[1 mark]

_____

_____

_____

0 3 . 4 Potable water is obtained from both groundwater **and** from sea water.

Describe how groundwater and sea water are treated to produce potable water.

[3 marks]

0 3 . 5 The percentage by mass of dissolved solids in a 6.50 g sample is 2.2%

Calculate the mass of the dissolved solids.

[2 marks]

Example 2: GCSE Trilogy Biology 2H 2022

0 1 This question is about the cycling of water and carbon in ecosystems.

0 1 . 1 Which reaction produces water?

[1 mark]

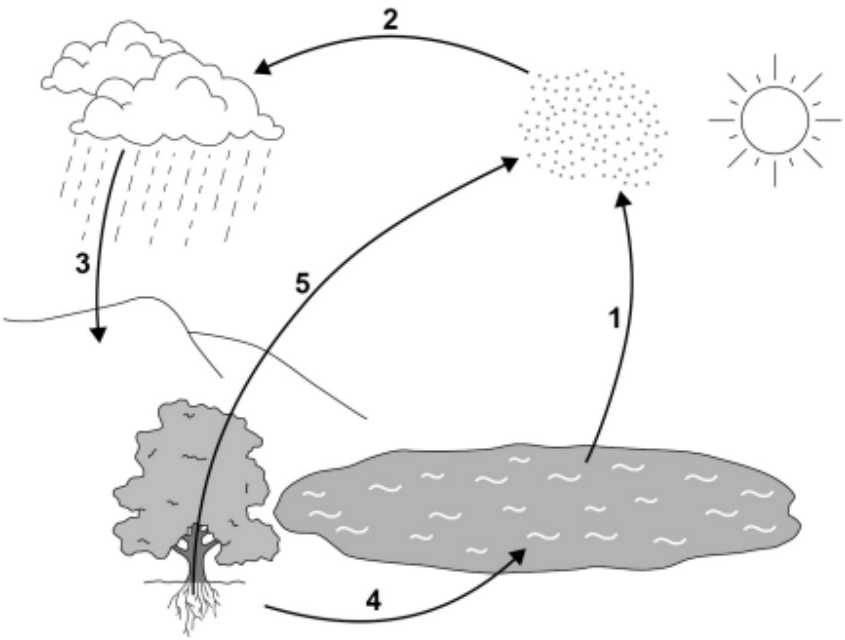
Tick (✓) **one** box.

- Aerobic respiration ☐
- Anaerobic respiration ☐
- Photosynthesis ☐

The water cycle provides water for plants and animals on land before the water goes into lakes and seas.

Figure 1 represents the water cycle.

Figure 1



0 1 . 2 Name the processes **1** to **5** shown on **Figure 1**.

[5 marks]

1 _____

2 _____

3 _____

4 _____

5 _____

0 1 . 3 In 2007 the population of the world was 6 000 000 000

A study found that 4.5% of the population had severe water shortage.

Calculate how many people had severe water shortage.

Give your answer in standard form.

[3 marks]

_____

_____

_____

_____

_____

Number of people (in standard form) = _____

0 1 . 4 Why do more people have severe water shortage now than in 2007?

[2 marks]

Tick (✓) **two** boxes.

- Climate change has increased the area of deserts. ☐
- Each person drinks less water. ☐
- More water is used to grow crops. ☐
- Sea levels have risen because the ice caps are melting. ☐
- Some countries have built de-salting factories for seawater. ☐

Leaves on a tree contain carbon compounds.

In autumn the leaves fall to the ground.

0 1 . 5 Microorganisms in the soil recycle carbon from the leaves so that the carbon is used for new plant growth.

Explain how.

[4 marks]

0 1 . 6 What is **one** benefit of fallen leaves for living plants?

[1 mark]

Tick (✓) **one** box.

- Energy is released for living plants. ☐
- Insect pests in the soil are killed. ☐
- Nitrates are released into the soil. ☐
- Oxygen is supplied to root cells. ☐

Structure of an exam question

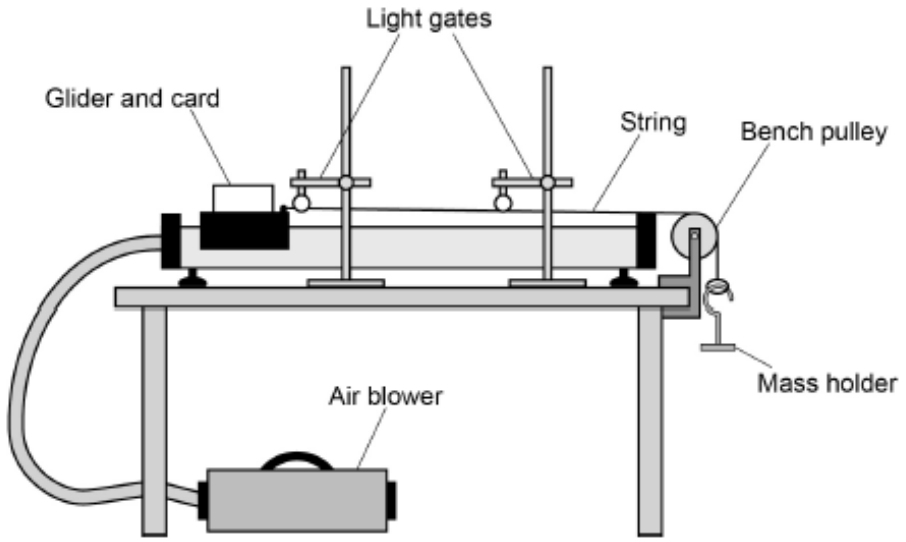
Example 3: GCSE Trilogy Physics 2F 2018 (standard demand)

0 7 A student investigated acceleration using gliders, an air track and light gates.

The air track reduces friction between the glider and the track to zero.

Figure 11 shows the apparatus.

Figure 11



The glider was released from rest and moved along the track.

The mass holder hit the ground before the card passed through the second light gate.

0 7 . 1 Which **two** statements describe the effect this would have on the glider?

[2 marks]

Tick **two** boxes.

- Its acceleration would decrease to zero. ☐
- Its acceleration would increase. ☐
- The resultant force on it would decrease to zero. ☐
- The resultant force on it would increase. ☐
- Its speed would increase. ☐

0 7 . 2 The mass holder should **not** hit the ground before the card passes through the second light gate.

Suggest **one** way that the student could stop this happening.

[1 mark]

The student increased the resultant force acting on the glider by adding more masses to the mass holder.

She calculated the acceleration of the glider for each resultant force.

Each test was done three times.

Table 2 shows the results.

Table 2

Resultant force in N	Acceleration in m/s²			Mean acceleration in m/s²
	Test 1	Test 2	Test 3	
0.20	1.3	1.2	1.3	1.26667
0.39	2.6	2.5	2.6	2.6
0.59	3.8	3.8	3.9	3.8
0.78	5.1	5.1	5.1	5.1
0.98	6.4	7.2	6.4	6.7

0 7 . 3 The student made **two** mistakes in the mean acceleration column.

Identify the mistakes the student made.

Suggest how each mistake can be corrected.

[4 marks]

0 7 . 4 Write a conclusion for this investigation.

Use the data in **Table 2**

[1 mark]

0 7 . 5 The student used a constant resultant force to accelerate the glider.

The student changed the mass of the glider and calculated the new acceleration.

She repeated this for different masses of the glider, keeping the resultant force constant.

The results are shown in **Table 3**

Table 3

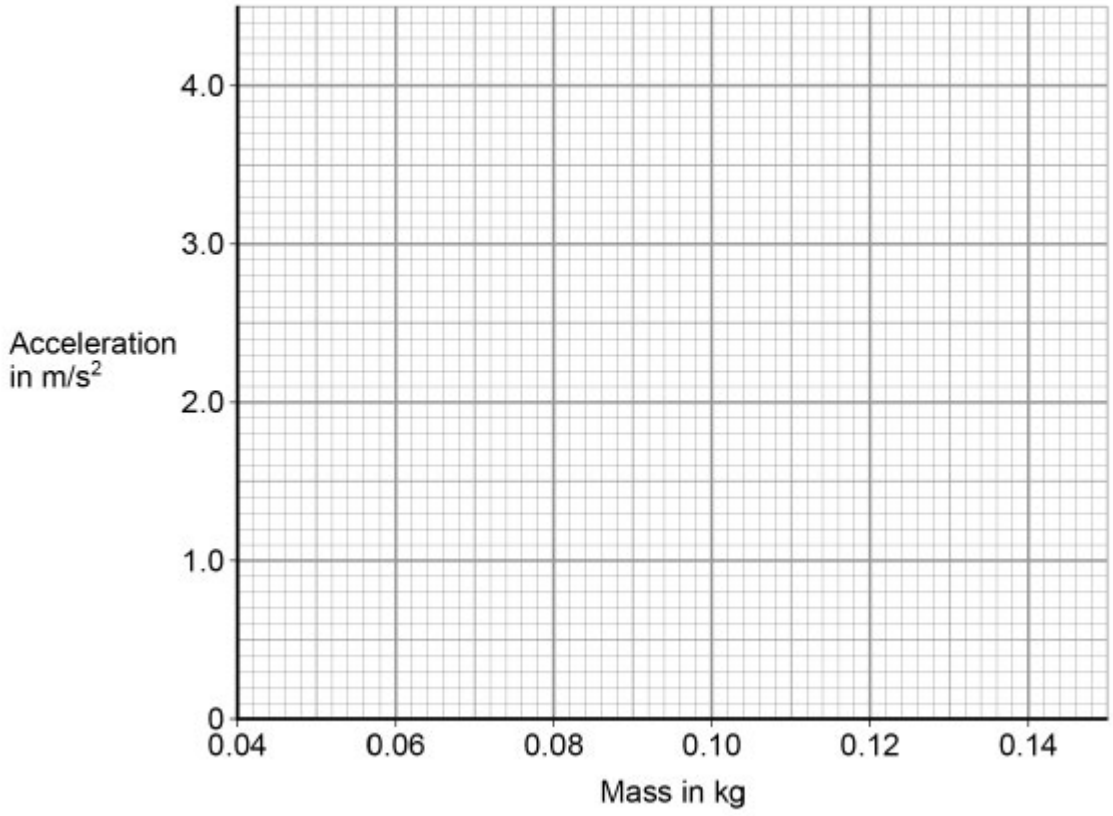
Mass of the glider in kg	Acceleration in m/s^2
0.060	3.5
0.080	2.6
0.10	2.0
0.12	1.7
0.14	1.4

Plot the results on **Figure 12**

Draw a line of best fit.

[3 marks]

Figure 12



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0 7 . 6 Describe the relationship between mass and acceleration.

[1 mark]

Applying the mark scheme

Example 4: GCSE Trilogy Physics 1F 2022

0 1 . 3 When the voltmeter was **not** connected to the circuit it gave a reading of 0.4 volts.

How can the student correct all the readings taken from the voltmeter?

[1 mark]

Tick (✓) **one** box.

- Add 0.4 volts to each reading ☑
- Divide each reading by 0.4 volts ☐
- Multiply each reading by 0.4 volts ☐
- Subtract 0.4 volts from each reading ☐

01.3	subtract 0.4 volts from each reading		1	AO1 6.2.1.4

Example 5: GCSE Chemistry 1F 2018

0 9 . 3 Iron is a transition metal.

Sodium is a Group 1 metal.

Give **two** differences between the properties of iron and sodium.

[2 marks]

1 more malluble

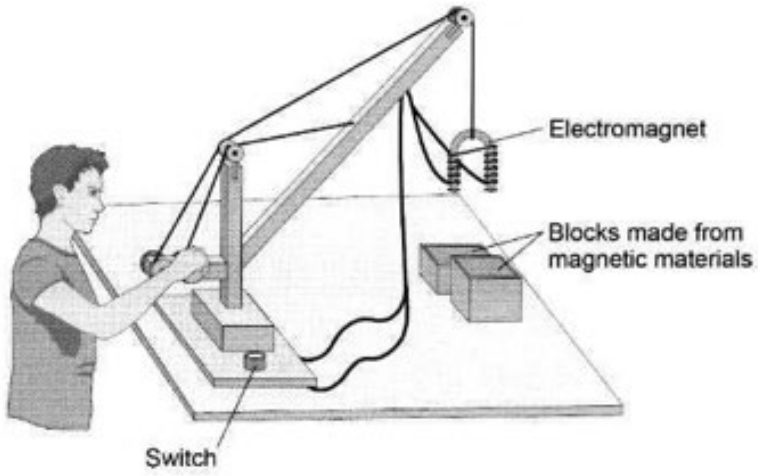
2 higher melting point and boiling point

09.3	any **two** from: • iron has a high(er) melting / boiling point • iron is dense(r) • iron is hard(er) • iron is strong(er) • iron is less reactive • iron has ions with different charges • iron forms coloured compounds • iron can be a catalyst	allow the converse statements for sodium allow transition metal for iron allow Group 1 metal for sodium ignore references to atomic structure ignore iron rusts allow iron is less malleable / ductile allow specific reactions showing difference in reactivity allow iron is magnetic	2	AO1 4.1.2.5 4.1.3.1 4.1.3.2

Example 6: GCSE Trilogy Physics 2F 2018

0 8 . 3 **Figure 14** shows a toy crane.

Figure 14



The toy crane uses an electromagnet to pick up and move the blocks.

Explain how this electromagnet is able to pick up and move the blocks.

[6 marks]

Because the blocks are made out of magnetic materials and the crane has a ~~huge~~ strong magnet on it.

The switch turns the magnetic force on then the blocks get picked up by the strong magnet and moved then for the crane to drop the blocks you have to press the switch.

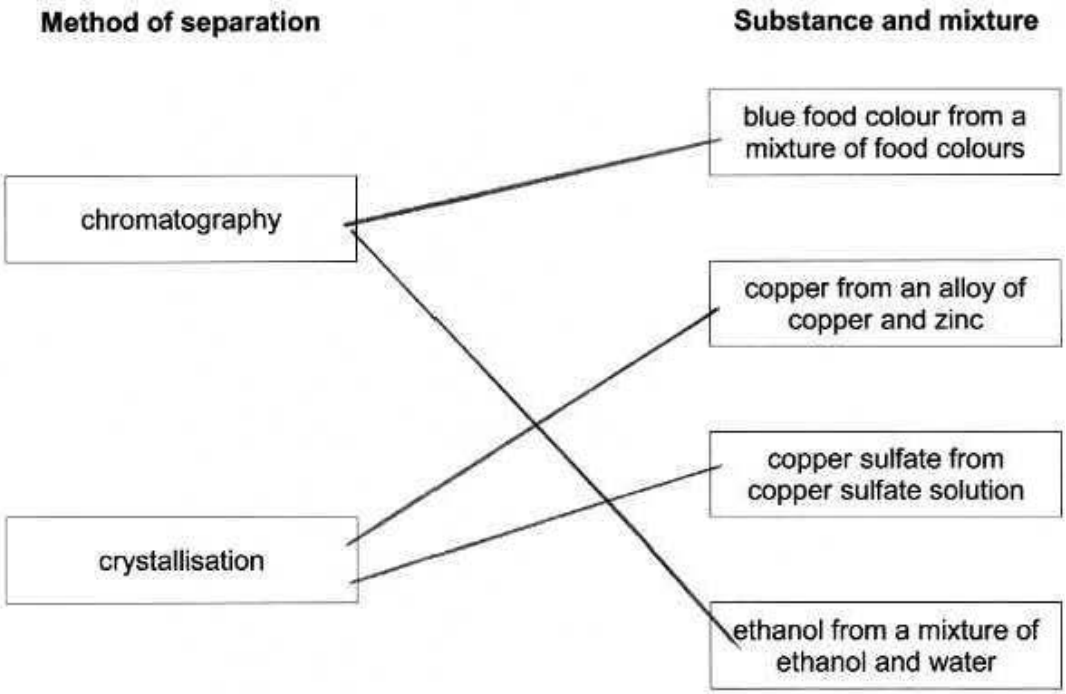
08.3	**Level 3:** Relevant points (reasons / causes) are identified, given in detail and logically linked to give a clear account.	5–6	AO2
	Level 2: Relevant points (reasons / causes) are identified, and there are attempts at logically linking. The resulting account is not fully clear.	3–4	AO2
	Level 1: Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.	1–2	AO1
	No relevant content	0	
	Indicative content • completing the circuit • turns the electromagnet on • there is a current in the coil • a magnetic field is produced around the coil • the iron core becomes magnetised • move electromagnet towards the blocks • the block is attracted to the electromagnet • moving the crane moves the block • switching off the current switches off the electromagnet • releasing the block		6.7.2.1

Example 7: GCSE Chemistry 1F 2019

Substances are separated from a mixture using different methods.

0 3 . 4 Draw **one** line from each method of separation to the substance and mixture it would separate.

[2 marks]



03.4	chromatography → blue food colour from a mixture of food colours crystallisation → copper sulfate from copper sulfate solution additional line from a box negates the mark for that box	1 1	AO2 4.1.1.2

Example 8: GCSE Trilogy Chemistry 2F 2018

0 3 . 2 The student did the test four times.

The student calculated the mass of solid on apparatus **X** after heating.

Table 3 shows the student's results.

Table 3

	Test 1	Test 2	Test 3	Test 4
Mass of solid in grams	0.12	0.29	0.14	0.15

Calculate the mean mass of solid.

Do not include the anomalous result in your calculation.

Give your answer to 2 significant figures.

[3 marks]

$\frac{0.12 + 0.29 + 0.14 + 0.15}{4}$

Mean mass = 0.175 g

03.2		an answer of 0.14 (g) scores **3** marks		
	identify 0.29 as anomaly		1	AO3 5.10.1.2
	$\frac{0.12 + 0.14 + 0.15}{3}$ **or** $\frac{0.41}{3}$	allow $\frac{0.12 + 0.29 + 0.14 + 0.15}{4}$ **or** $\frac{0.70}{4}$	1	AO2 5.10.1.2
	(=) 0.14 (g)	allow 0.18 (g) if first marking point not awarded	1	AO2 5.10.1.2

Example 9 GCSE Chemistry 1H 2022

0 8 . 3 25.00 cm^3 of the hydrochloric acid reacted with 23.50 cm^3 of the 0.100 mol/dm^3 barium hydroxide solution.

The equation for the reaction is:

2 : 1 1 : 2

$$2HCl(aq) + Ba(OH)_2(aq) \rightarrow BaCl_2(aq) + 2H_2O(l)$$

n=C x V

no of moles = concentration x volume

Calculate the concentration of the hydrochloric acid in mol/dm^3.

[4 marks]

	barium hydroxide	hcl
N	2.35	4.7
C	0.1	0.188
V	23.5	25

2:1 ratio hcl barium hydroxide

concentration = mol n ÷ V

Concentration of the hydrochloric acid = 0.188 mol/dm^3

08.3	(moles $Ba(OH)_2$ = $\frac{23.50}{1000} \times 0.100$) = 0.00235		1	AO2 4.3.4 4.4.2.5 RPA2
	(moles HCl = 0.00235 × 2 =) 0.00470	allow correct use of an incorrectly calculated number of moles of $Ba(OH)_2$	1	
	(concentration =) $0.00470 \times \frac{1000}{25.0}$	allow correct use of an incorrectly calculated number of moles of HCl	1	
	= 0.188 (mol/dm^3)		1	
	alternative approach:			
	$\left(\text{ratio } \frac{\text{moles HCl}}{\text{moles } Ba(OH)_2} = \right)$	allow inverted expression		
	$\frac{2}{1} = \frac{25.0 \times \text{concentration}}{23.50 \times 0.100}$ **(2)**	allow **1** mark for the expression with an incorrect mole ratio		
	(concentration =) $\frac{2 \times 23.50 \times 0.100}{25.00}$ (1)	allow correct use of the expression with an incorrect mole ratio		
	= 0.188 (mol/dm^3) (1)			

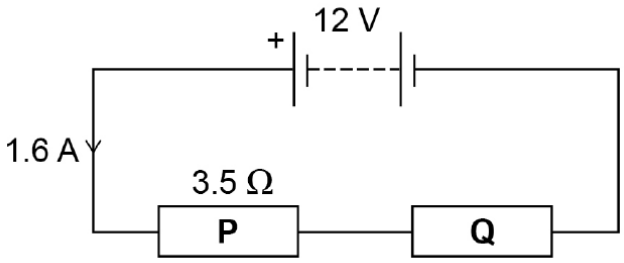
Summary information on assessing Physics equations

- 23 Physics equations that learners need to know and be able to apply (21 in Combined Science).
- 12 further Physics equations (7 in Combined Science) that learners must be able to select from a list and apply. Learners will be given the prompt 'Use the correct equation from the Equation sheet'.

Low demand, grades 1–3 (Foundation tier only)

- Recall (AO1) grades 1–3 – learners will be asked to recall an equation by multiple choice and link boxes. Will only be worth 1 mark.
- Apply (AO2) – learners will be given the equation to apply.
- Simple equations with substitution of two numbers, no transformations.

Example 10: GCSE Physics 1F 2018



0 3 . 2 Calculate the total resistance of the circuit in **Figure 3**.

Use the equation:

$$\text{resistance} = \frac{\text{potential difference}}{\text{current}}$$

[2 marks]

12 x 1.6

Total resistance = 19.2 Ω

03.2	$R = \frac{12}{1.6}$ R = 7.5 (Ω)	an answer of 7.5 (Ω) scores **2** marks	1 1	AO2 4.2.1.3

Standard demand, grades 4–5 (Foundation and Higher tier)

- Learners will be given the prompt 'Write down the equation that links…' so they access AO1. These will be written in alphabetical order, not necessarily in the way they need to be used.
- Calculation will involve something 'extra', eg simple transformation.

Example 11: GCSE Physics 1F 2018

0 7 . 3 Write down the equation that links charge flow, current and time.

[1 mark]

C = I T

0 7 . 4 The fuse wire melts when 1.52 coulombs of charge flows through the fuse in 0.40 seconds.

Calculate the current at which the fuse wire melts.

[3 marks]

1.52 ÷ 0.4 =

Current = _____ A

07.3	charge flow = current x time	allow Q = It	1	AO1 4.2.1.2
07.4	1.52 = I × 0.40 $I = \frac{1.52}{0.40}$ I = 3.8 (A)	an answer of 3.8 (A) scores **3** marks	1 1 1	AO2 4.2.1.2

Example 12: GCSE Physics 1F 2018

0 9 . 4 Write down the equation that links gravitational field strength, gravitational potential energy, height and mass.

[1 mark]

Gravitational field strength = gravitational potential energy / height x mass

GFS = GPE ÷ (mass ÷ height)

0 9 . 5 The lift goes up 14 m. The total mass of the people in the lift is 280 kg.

gravitational field strength = 9.8 N/kg

Calculate the increase in gravitational potential energy of the people in the lift.

Give your answer to 2 significant figures.

[3 marks]

gpe = gfs x m x h

= 280 x 14 x 9.8

= 38416

= 38 (2sf)

Increase in gravitational potential energy = 38 J

09.4	gravitational potential energy = mass × gravitational field strength × height	allow E_p = m g h	1	AO1 4.1.1.2
09.5		an answer of 38 000 scores **3** marks		AO2 4.1.1.2
	E_p = 280 × 9.8 × 14		1	
	E_p = 38 416 (J)		1	
	E_p = 38 000 (J)	an answer that rounds to 38 000 scores **2** marks	1	

High demand, grades 6–9 (Higher tier only)

- No prompts about which equation to use.
- Learners won't gain marks simply for writing the equation down without doing something with it (so no AO1).
- Questions will involve transformations or 'something extra'.
- Could be multi-step.

Example 13: GCSE Trilogy Physics 2H 2018

For calculations that involve multiple steps (5- or 6-mark extended response on higher tier), learners may need to use more than one equation.

0 4 . 3 A student hangs a weight on a newtonmeter.

The energy now stored in the spring in the newtonmeter is 4.5×10^{-2} J

The student then increases the weight on the newtonmeter by 2.0 N

Calculate the total extension of the spring.

Spring constant = 400 N/m

[6 marks]

energy = 0.5 x spring constant x extension²

0.045 J = 0.5 x 400 x ? (2.25 x 10⁻⁴)

(0.015)

~~energy = mass x distance~~

force exerted on a spring = spring constant x extension

2N ÷ 400 = extension = 5 x 10⁻³ + 0.015 = 0.02

Total extension = 0.02 m

04.3		an answer of 0.02 (m) gains **6** marks		AO2 6.5.3
	$4.5 \times 10^{-2} = 0.5 \times 400 \times e^2$	this mark may be awarded if the standard form value is incorrectly converted	1	
	$e = \sqrt{\frac{4.5 \times 10^{-2}}{0.5 \times 400}}$	this mark may be awarded if the standard form value is incorrectly converted allow $e^2 = \frac{4.5 \times 10^{-2}}{0.5 \times 400}$	1	
	$e = 0.015$ (m)	this answer only	1	
	$2.0 = 400 \times e$		1	
	$e = 0.005$ (m)	this answer only	1	
	$0.015 + 0.005 = 0.02$ (m)	allow their initial extension + their additional extension correctly calculated	1	

Graphs

We use a variety of graphs to test a range of skills covering all levels of demand. Learners can use a pencil or a pen but a sharp pencil is best as they can then rub out mistakes.

Learners may be asked to:

- plot the data from a table:
  - Crosses (x) or dots can be used but crosses (x) are easier to see.
  - Marked for accuracy – different divisions of scales are used depending on demand.
- label the axis – use the headings in the data table to help decide on the labels
- draw the scale – try and use most of the available graph paper so the examiner can see clearly what you have done
- draw a line of best fit – in science because we are using real data, lines of best fit can be straight or curved. Look at the pattern in the data first to decide.

Example 14: GCSE Trilogy Physics 1F 2018

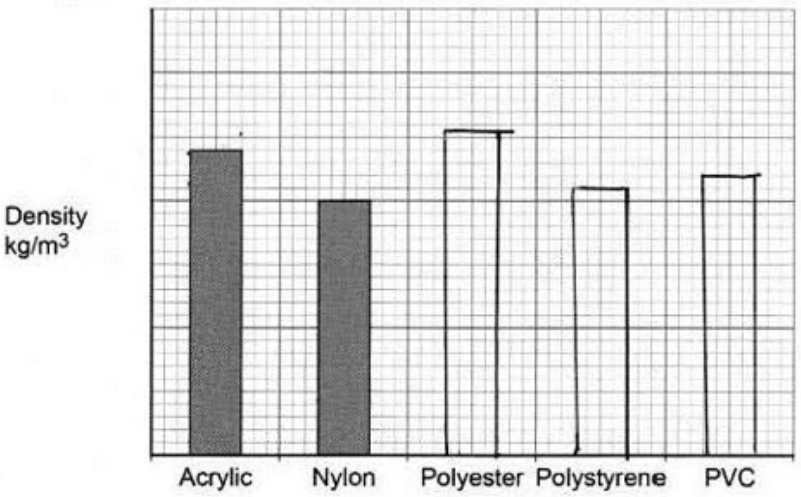
Table 3 shows the results.

Table 3

Plastic material	Density in kg/m^3
Acrylic	1200
Nylon	1000
Polyester	1380
Polystyrene	1040
PVC	1100

Figure 4 shows the results plotted in a bar chart.

Figure 4



plastic material.

Complete **Figure 4**

You should:

- Write the correct scale on the y-axis.
- Draw the bars for polyester, polystyrene and PVC.

[4 marks]

07.2	all *y*-axis values correct (minimum of 3)	allow **1** mark for two correct values	2	AO2 6.3.1.1
	all bars drawn to the correct height	allow **1** mark for two correct bars allow ± ½ small square	2	

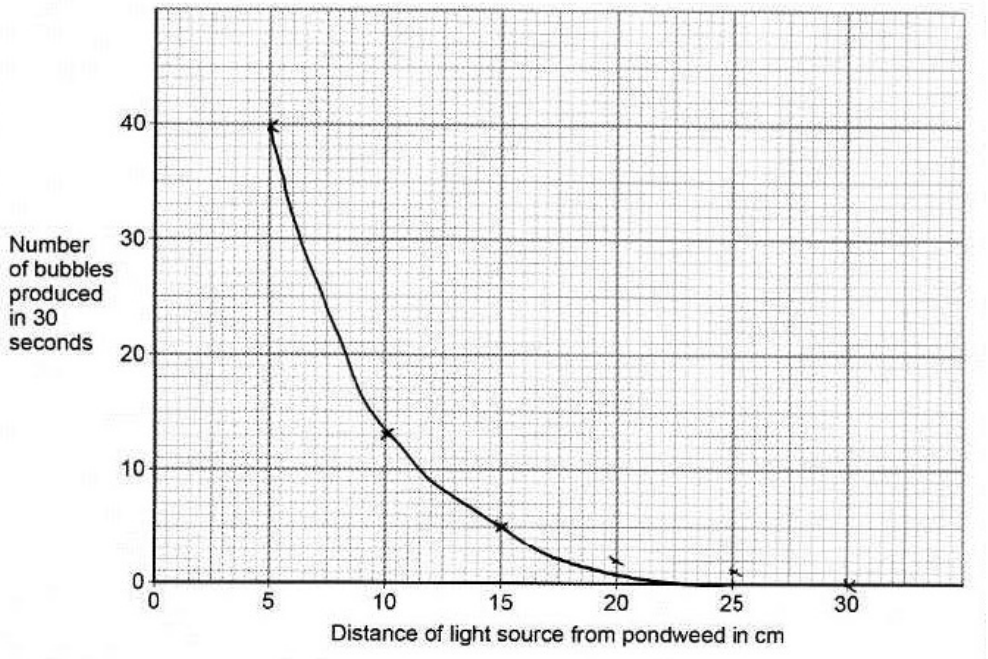
Example 15: GCSE Trilogy Biology 1F 2018

0 2 . 5 Plot the data from **Table 1** on **Figure 5**

Draw a line of best fit.

[3 marks]

Figure 5



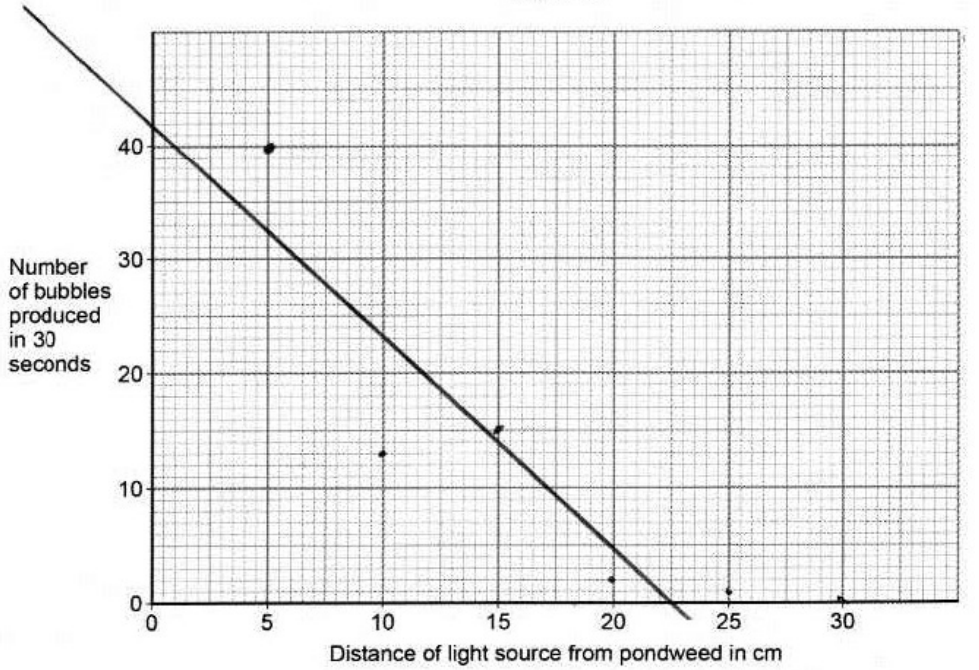
Example 16: GCSE Trilogy Biology 1F 2018

0 2 . 5 Plot the data from **Table 1** on **Figure 5**

Draw a line of best fit.

[3 marks]

Figure 5

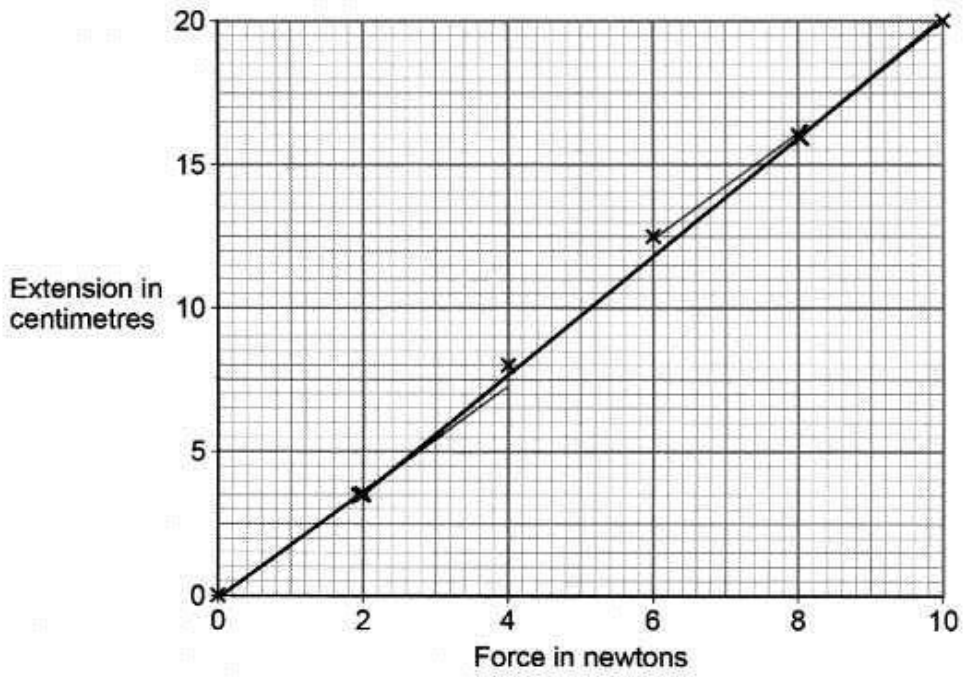


02.5		(where a bar chart has been plotted) allow **1** mark for all bars plotted correctly if points are plotted as well as bars, ignore bars		AO2 4.4.1.2
	all points plotted correctly	allow ± ½ a square allow **1** mark for three points correctly plotted	2	
	smooth curve drawn through all points	ignore extensions of line / curve unless inconsistent with line / curve drawn	1	

Example 17: GCSE Physics 2F 2018

Figure 15 shows some of the data obtained by the student.

Figure 15



1 1 . 3 Complete **Figure 15** by plotting the missing data from **Table 4.**

Draw the line of best fit.

Table 4 is repeated here to help you answer this question.

[2 marks]

Table 4

Force in N	Extension in cm
0	0.0
2	3.5
4	8.0
6	12.5
8	16.0
10	20.0

11.3	both points plotted correctly correct line of best fit drawn	 to pass through (0,0) and (10,20)	1 1	AO2 4.5.3

Extended response

One of the assessment criteria all exam boards have to assess is a learner's ability to write an answer that's 'coherent, relevant, substantiated and logically structured'.

These questions carry 4–6 marks and are usually set at standard demand or above, so on the foundation tier they're often part of the last questions.

They're marked using 'levels of response' mark schemes (unless multi-step calculation).

Levels of response mark schemes provide a framework in which learners are rewarded according to the level of skill they show and the correct content they include. There isn't one right answer. The mark is determined by:

- looking at the overall quality of the answer
- taking into account the descriptor for each level
- taking into account the content included.

Typical command works are 'plan', 'describe', 'explain', 'compare' and 'evaluate'. Each command word has a different levels descriptor.

When a learner writes their answer they can:

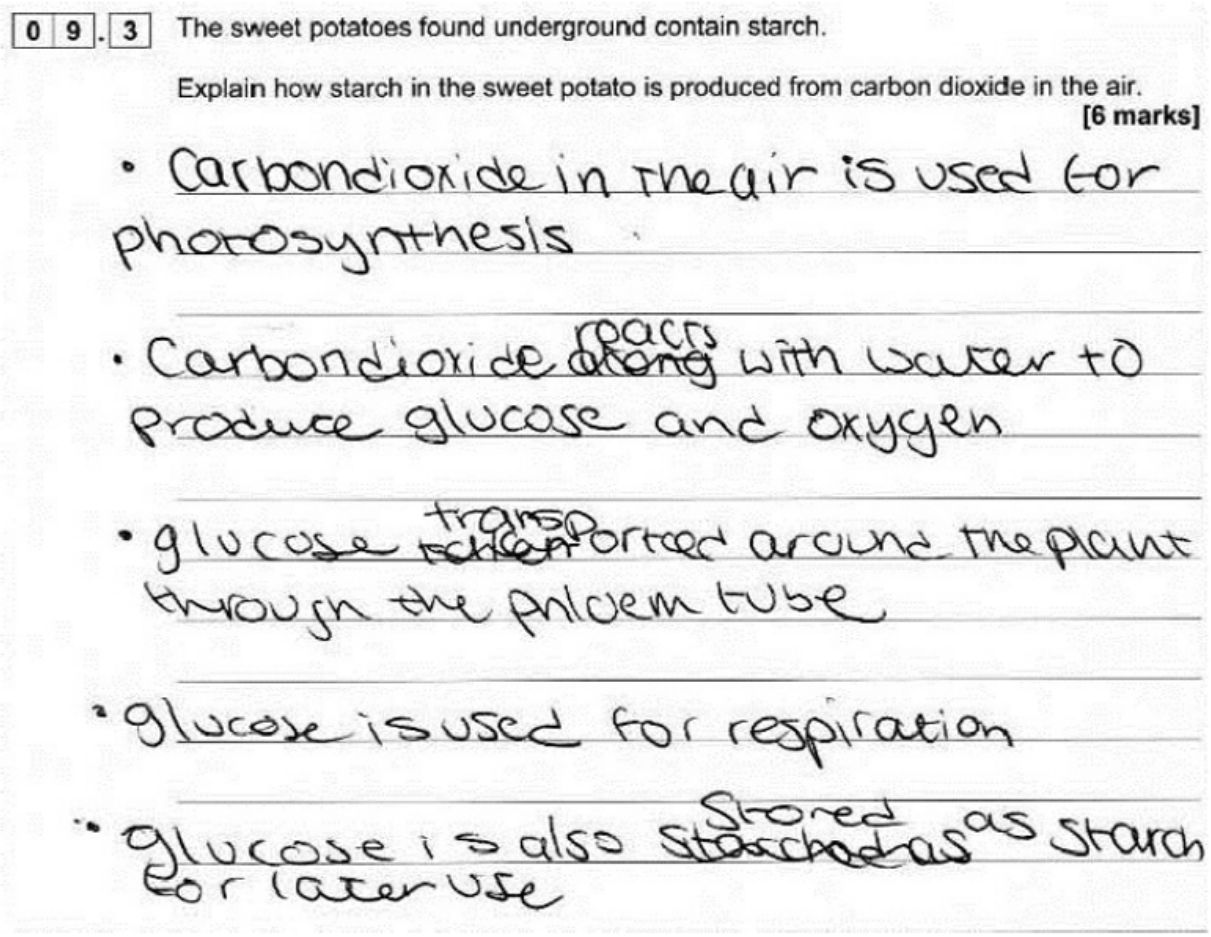
- write in **paragraphs**
- use short sentences in **bullet points**
- use **labelled diagrams**, especially if it's planning an experiment or writing the method. They need to refer to them in their answer, eg 'set up the equipment in the diagram and then…' A logically sequenced series of annotated diagrams can save time writing and may be clearer than a long written account
- use **tables** with headings for 'compare' and 'evaluate' questions. Learners must be sure to explain what the table is showing. Statements, explanations and numerical data need to be clearly linked across the table so that like is being compared with like. An evaluation has to have a judgement at the end.

Answers don't need to be long; learners need to be concise and keep to the point.

The **number of answer lines** is an indication of the maximum amount of space they should be using, not the space they must fill. Make sure learners understand this and that they shouldn't be tempted to keep writing to fill the space. If they do, they may end up contradicting themselves or including wrong statements that affect the overall quality of the answer.

Encourage learners to **always have a go** at these questions as any relevant information may get them a mark and every mark counts!

Example 18: GCSE Synergy 1F 2018



0 9 . 3 The sweet potatoes found underground contain starch.

Explain how starch in the sweet potato is produced from carbon dioxide in the air.

[6 marks]

- Carbondioxide in the air is used for photosynthesis
- Carbondioxide ~~along~~ reacts with water to produce glucose and oxygen
- glucose ~~is taken~~ transported around the plant through the phloem tube
- glucose is used for respiration
- glucose is also ~~stored as~~ Stored as starch for later use

09.3	**Level 3:** Relevant points (reasons / causes) are identified, given in detail and logically linked to form a clear account.	5–6	AO2
	Level 2: Relevant points (reasons / causes) are identified, and there are attempts at logical linking. The resulting account is not fully clear.	3–4	AO1
	Level 1: Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.	1–2	AO1
	No relevant content	0	
	Indicative content • carbon dioxide enters the leaf through stomata • glucose / sugars produced by photosynthesis (in leaves) • some detail of photosynthesis • transport / translocation (of glucose / sugars) • in phloem • glucose is converted to starch • (starch is a) long chain of glucose / sugar molecules • starch as storage (of glucose / sugars)		4.2.1.5 4.2.2.5 4.2.2.7

Example 19: GCSE Chemistry 2F 2018

0 6 . 4 **Table 4** gives some information about disposable cups.

Table 4

	Coated paper cups	Poly(styrene) cups
Source of raw materials	Wood	Crude oil
Energy to make 1 cup in arbitrary units	550	200
Biodegradable	Yes	No
Recyclable	No	Yes

Compare the advantages and disadvantages of using coated paper and poly(styrene) to make disposable cups.

Use **Table 4** and your knowledge and understanding of life cycle assessments (LCAs).

[4 marks]

Coated	Poly(styrene)
+ It is made out of wood, which is renewable, so doesn't run out	+ It is made out of crude oil, which is non-renewable, so does eventually run out
- It takes 350 more energy units to make, so would cost more to produce	+ Takes 350 less energy units to make, so would cost less to produce
+ It's biodegradable meaning, it won't be churned on a landfill and won't harm the earth	- It's not biodegradable, so it will pollute the earth and stay on the landfill

06.4	**Level 2:** Scientifically relevant features are identified; the way(s) in which they are similar / different is made clear and (where appropriate) the magnitude of the similarity / difference is noted.	3–4	AO3
	Level 1: Relevant features are identified and differences noted.	1–2	AO2
	No relevant content	0	
	Indicative content for coated paper cups – accept converse for poly(styrene) **advantages** • produced from a renewable resource • biodegradable so breaks down **disadvantages** • higher energy costs • greater use of fossil fuels and consequent pollution • not recyclable so uses landfill		4.10.1.1 4.10.2.1

Example 20: GCSE Chemistry 2F 2018

Compare the advantages and disadvantages of using coated paper and poly(styrene) to make disposable cups.

Use **Table 4** and your knowledge and understanding of life cycle assessments (LCAs).

[4 marks]

Adv Coated paper cups
- It is biodegradable

Dis Coated paper cups
- Requires 350 more aibitary units
- It is not recyclable

Adv Poly(styrene) cups
- It is recyclable
- Less energy required

Dis Poly(styrene) cups
- Not Biodegradable

Example 21: GCSE Physics 2F 2018

1 1 A student carried out an investigation to determine the spring constant of a spring.

Table 4 gives the data obtained by the student.

Table 4

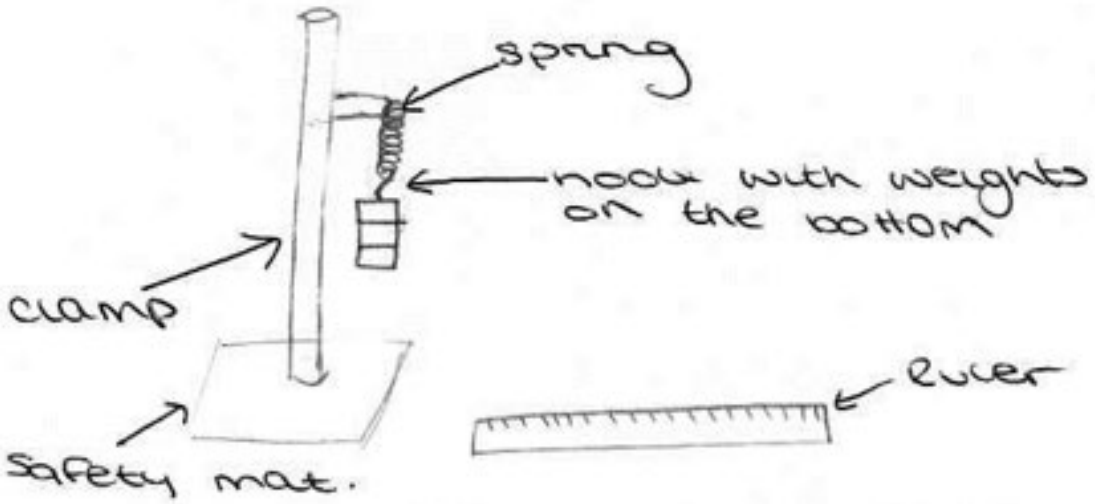
Force in N	Extension in cm
0	0.0
2	3.5
4	8.0
6	12.5
8	16.0
10	20.0

1 1 . 1 Describe a method the student could have used to obtain the data given in **Table 4**.

Your answer should include any cause of inaccuracy in the data.

Your answer may include a labelled diagram.

[6 marks]



- Get a clamp, a ruler (in cm), a spring, a hook, weights of 2N each
- Attach the spring to the clamp and add the hook (with one weight of 2N) to the bottom
- Using the ruler, measure the extension of the spring and record the results
- Remove the hook from the spring and increase the weight by 2N, then attach the hook again to the spring
- Measure the extension again, record the results.
- Keep repeating this until you have reached a force of 10N and have recorded all of the results.

11.1	**Level 3:** The method would lead to the production of a valid outcome. All key steps are identified and logically sequenced.	5–6	AO1 4.5.3
	Level 2: The method would not necessarily lead to a valid outcome. Most steps are identified, but the method is not fully logically sequenced.	3–4	
	Level 1: The method would not lead to a valid outcome. Some relevant steps are identified, but links are not made clear.	1–2	
	No relevant content	0	
	Indicative content set up a clamp stand with a clamp hang the spring from the clamp use a second clamp and boss to fix a (half) metre ruler alongside the spring record the metre ruler reading that is level with the bottom of the spring hang a 2 N weight from the bottom of the spring record the new position of the bottom of the spring calculate the extension of the spring measure the extension of the spring add further weights to the spring so the force increases 2 N at a time up to 10 N for each new force record the position of the bottom of the spring and calculate / measure the extension **possible source of inaccuracy** not fixing the ruler in position but simply holding the ruler next to the spring not clamping the ruler vertical misjudging the position of the bottom of the spring parallax error allow any other sensible suggestion that could reasonably lead to inaccuracy in the data allow a description that would increase accuracy repeating the measurements is insufficient		

GCSE Science command words

Command words are the words and phrases used in exams that tell students how they should answer a question.

Balance

Students need to balance a chemical equation.

Calculate

Students should use numbers given in the question to work out the answer.

Choose

Select from a range of alternatives.

Compare

This requires the student to describe the similarities and/or differences between things, not just write about one.

Complete

Answers should be written in the space provided, for example, on a diagram, in spaces in a sentence or in a table.

Define

Specify the meaning of something.

Describe

Students may be asked to recall some facts, events or process in an accurate way.

Design

Set out how something will be done.

Determine

Use given data or information to obtain and answer.

Draw

To produce, or add to, a diagram.

Estimate

Assign an approximate value.

Evaluate

Students should use the information supplied, as well as their knowledge and understanding, to consider evidence for and against when making a judgement.

Explain

Students should make something clear, or state the reasons for something happening.

Give

Only a short answer is required, not an explanation or a description.

How/What/When/Where/Which/Who/Why

These can be used for more direct questions.

Identify

Name or otherwise characterise.

Justify

Use evidence from the information supplied to support an answer.

Label

Provide appropriate names on a diagram.

Measure

Find an item of data for a given quantity.

Name

Only a short answer is required, not an explanation or a description. Often it can be answered with a single word, phrase or sentence.

Plan

Write a method.

Plot

Mark on a graph using data given.

Predict

Give a plausible outcome.

Show

Provide structured evidence to reach a conclusion.

Sketch

Draw approximately.

Suggest

This term is used in questions where students need to apply their knowledge and understanding to a new situation.

Use

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. In some cases students might be asked to use their own knowledge and understanding.

Write

Only a short answer is required, not an explanation or a description

Comments and marks awarded

Example 4
The learner has clearly crossed out one incorrect response, but has then drawn a line across two answers below. This is an example of multiple responses in a tick box – so immediately scores zero. An incorrect response negates a correct response.
0 marks

Example 5
In this response it's not clear which metal the response refers to. It could be either iron or sodium.
0 marks

Example 6
The learner simply **repeats the label** on the diagram, which isn't worth any marks. The learner identifies that the switch turns the magnet on and the magnet picks the block up but there's **no linking of ideas** so this isn't a Level 2 answer. Learners have to add something new to their answer that shows understanding of what happening or link new ideas together.
Level 1, 2 marks

Example 7
The learner has drawn two lines from each method so, although for each method one of the answers they've chosen is correct, the incorrect answer negates the correct one.
0 marks

Example 8
The learner gains 1 compensatory mark for calculating the mean even though they haven't removed the anomalous result. However, their answer isn't to 2 significant figures, so marking point 3 wasn't given. If they had put it to 2 significant figures and the examiner could see they'd used numbers from the question they would have got this marking point.
1 mark

Example 9
Incorrect number of moles, because the volume isn't converted to dm^3 so marking point 1 isn't given. Marking point 2 is given because they've correctly used their incorrect number from the first step – the failure to convert volume to dm^3 is only penalised once. This shows how important it is to read the steps in the working. Marking points 3 and 4 are given.
3 marks

Example 10
This is a common mistake we find where we give them an equation and they don't use it – it's not a trick. **The learner didn't use the equation as given** – they incorrectly rearranged the equation. At low demand learners won't be asked to do this. They multiplied rather than divided so their answer was incorrect.
0 marks

Example 11
Most learners write the equation down in **words** but **credit is given for using symbols** if the correct symbols are used, ie Q for charge flow, I for current and t for time. If learner just put the 'equation triangle', this won't get marks as it doesn't show the examiner how the variables are linked. They need to write it out properly. They can use it as a prompt to help them remember the equation.

In this example the wrong symbol is given for charge in **07.3**. In this question the variables are in the right order when written alphabetically but this isn't always the case.
0 marks

In **07.4** the substitution and rearrangement are correct but the final calculation isn't given.
2 marks

Example 12
This is just another example. Remember the **variables are written in alphabetical order only in the stem of the question**. They need to write the equation out as they have learnt it. They don't need to rearrange it here – if they do and it's correct they will of course get the mark, so – gravitational potential energy = mass x gravitational field strength x height.

09.4 The learner here has got very confused as they've tried to rearrange the equation in the order it's been written in the question.
0 marks

09.5 The same learner then uses the correct equation, substitutes the values and calculates gpe correctly. The learner rounds 38,410 to 38 instead of 38,000, so doesn't score the final mark.
2 marks

Example 13
This shows a high demand question – no prompts – substitution, rearrangement and unit conversion is common and for these 5–6-markers they'll often need to use two equations. This response is completely correct and gains full marks.
6 marks

Example 14
The learner has labelled the *x*-axis instead of adding the scale to the *y*-axis so can't get the first marking point. They've correctly drawn two of the bars.
2 marks

Example 15
The learner has correctly plotted all the points from the table of data, although the crosses could have been clearer. They've attempted to draw a curved line of best fit, but it hasn't been drawn through all the points and is quite rough. As such, the mark can't be awarded.
2 marks

Example 16
The learner has plotted five of the six points correctly, within the tolerance allowed, so gains 1 mark for the plotting. The line of best fit is incorrect, so the mark for this can't be awarded.
1 mark

Example 17
The points have been plotted correctly, so the mark is awarded. This is a straight line of best fit but is too untidy to gain the mark – learners should use a ruler. Make sure if 0,0 is asked to be plotted the line goes through the origin.
1 mark

Example 18
This answer is given as a clear sequence of relevant bullet points, which link to give a clear account of what happens in the plant. The level of detail given is sufficient for Level 3 and this learner gains full marks.
6 marks

Example 19
This learner has presented their comparison in tabular form, which is perfectly acceptable. They've identified scientifically relevant features of both types of cup, and clearly linked each feature to whether it's an advantage or disadvantage. The comparison of the features of the two types of cup is clearly shown in the tabular presentation, and there's numerical data to indicate the magnitude of the difference in cost production. This is a top Level 2 answer and deserves full marks.
4 marks

Example 20
This answer to the same question isn't as good. General advantages and disadvantages are identified here but there's no explanation of why it's an advantage or disadvantage. They've just repeated the information in the table. What's needed is, for example: Paper cups aren't recyclable **so they end up in landfill** or they are biodegradable **so they break down or rot.** The layout doesn't show how the two cups compare against each other.
1 mark

Example 21
The method given will produce a valid outcome, so is a Level 3 response. There's a correct, clearly labelled diagram, and if they'd referred to this they wouldn't have needed to rewrite the set-up as in bullets one and two. The response lacks some detail as there's no reference to calculating extension or causes of inaccuracy, so it's not at the top of Level 3.
5 marks

Notes

Contact us

Our friendly team will be happy to support you between 8am and 5pm, Monday to Friday.

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