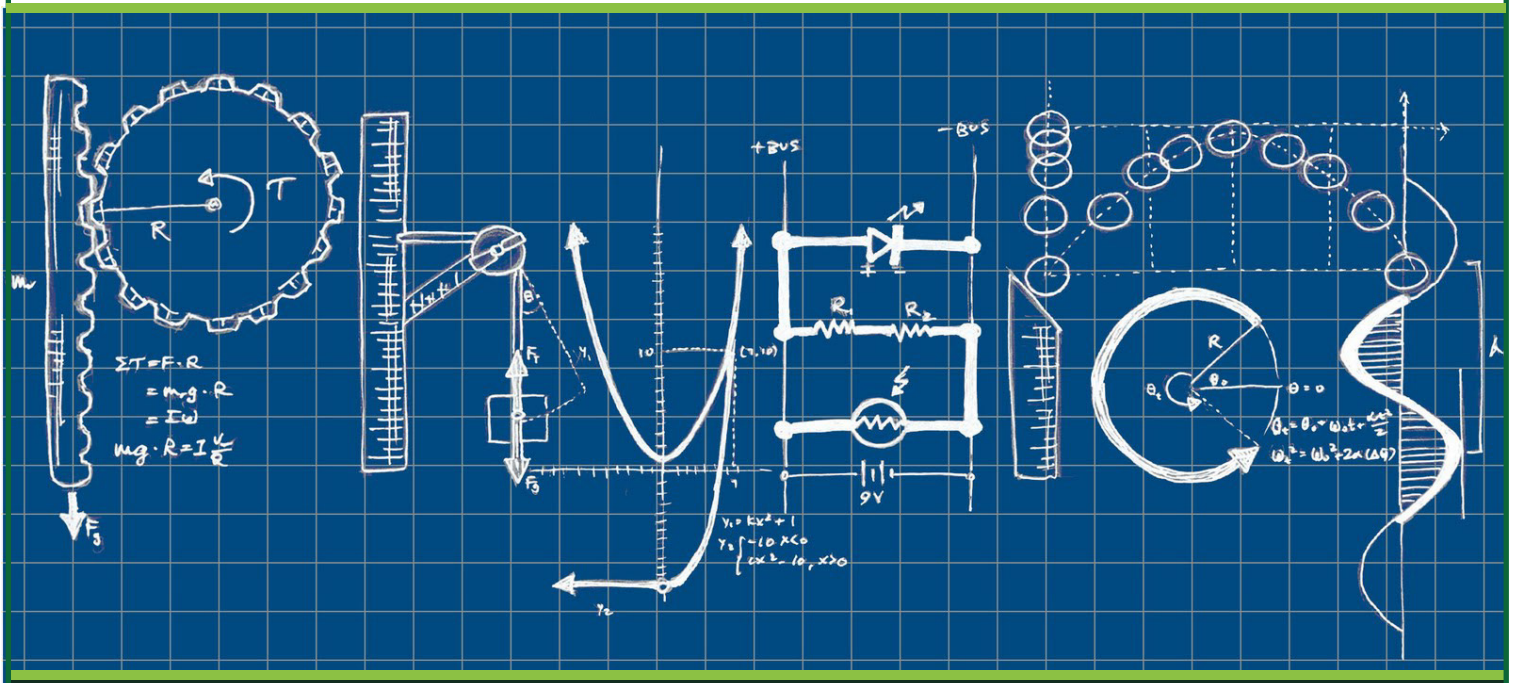
Bentley Wood
High School for Girls

Physics
Bridging work

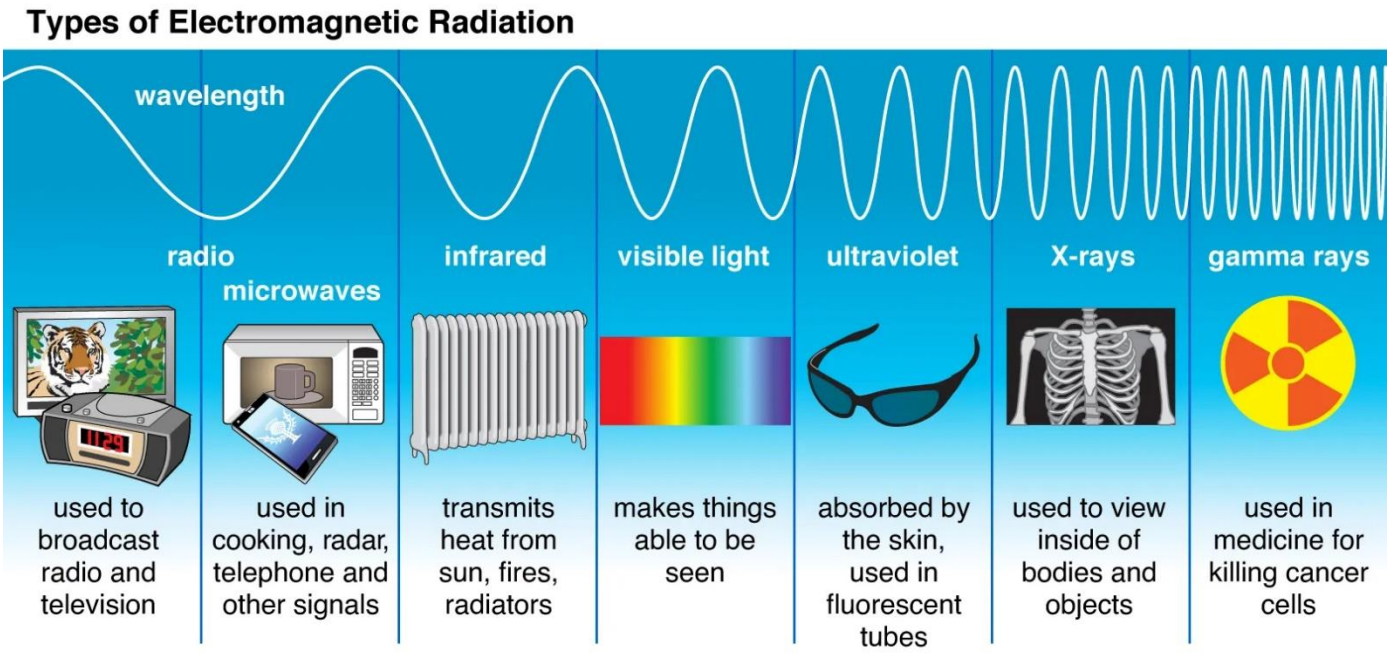
Year 10 into 11 for 2023/24

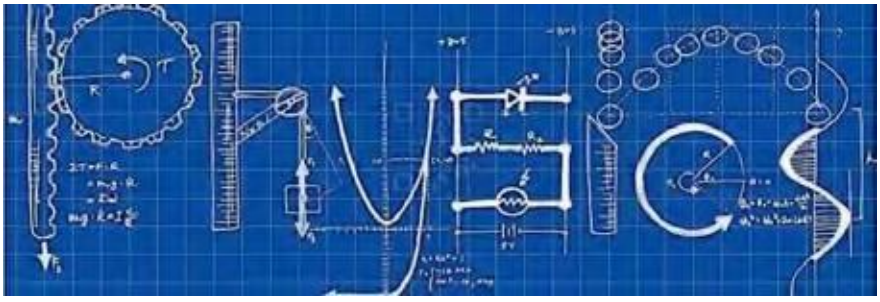


Name: _____

Tutor Group: _____

Teacher: _____





BRIDGING WORK 10 to 11

Bentley Wood
High School for Girls

WELCOME TO YEAR 11 PHYSICS

The purpose of this booklet is to give you essential information and resources for the GCSE Physics course. This booklet will also help you to understand and develop the skills you will need.

Please remember the following items for **EVERY** lesson – **ESSENTIAL**:

- Pens (highlighters are useful too) and your book
- **Calculator**, ruler and pencils
- Your text book

We hope you enjoy learning Physics BUT sometimes even the best of students can have problems:

- **Problems with work**
- **Problems understanding concepts**
- **Problems getting your head round all the theories in physics**
- **Problems with completing homework**
- **Problems in their personal lives**

If any of this applies to you, don't feel there's nowhere to turn – **THERE IS!**

ALL the staff in the Physics Department will be happy to talk through your concerns or can advise you – so don't panic or think about giving up, **HELP IS AT HAND**.

Come and find us, or e-mail – no problem is ever so big that we can't help, honest!

B Koyejo	bkoyejo@bentleywood.harrow.sch.uk
A Binnion	Abinnion@bentleywood.harrow.sch.uk

Expectations

As a part of its quality approach to teaching, the Physics Department follows a common policy on the setting and marking of work. This code of practice is followed by both staff and students and is aimed to help you achieve success in Physics.

What we expect of YOU

- It is expected that your attendance will be 100% . If you do miss a lesson for medical or academic reasons it is YOUR responsibility to catch up on the work that you have missed.
- You are expected to complete homework for each double lesson. This will be set on teams in the CAP format.
- You are expected to manage and organise your work effectively, and to be responsible for keeping your notes, and book up to date.
- You are expected to listen respectfully to your peers in discussions and group work

What you can expect of US

- Assessed work will be marked and handed back within TWO weeks of the handing in date.
- We will always be willing to discuss your progress and support your learning.

Useful websites

The following Internet resources are useful and will help with your GCSE Physics course:

Exam board website:

- https://www.aqa.org.uk/subjects/science/gcse/physics-8463/changes-for-2022 TRIPLE
- https://www.aqa.org.uk/subjects/science/gcse/combined-science-trilogy-8464 COMBINED

Revision and consolidation of knowledge:

- https://getrevising.co.uk/
- https://senecalearning.com/en-GB/
- https://www.savemyexams.co.uk/gcse/physics/
- https://studywise.co.uk/gcse-revision/physics/
- https://digestiblenotes.com/physics/gcse_physics.php
- https://www.revisely.co.uk/gcse/
- https://snaprevise.co.uk/
- https://www.physicsandmathstutor.com/
- https://www.bbc.co.uk/bitesize/levels/z98jmp3
- https://www.thenational.academy/
- https://quizlet.com/en-gb
- https://isaacphysics.org/
- https://www.freesciencelessons.co.uk/gcse-physics-paper-1/physics-paper-1-required-practicals/
- Equation 21
- My GCSE Science. Username: school e-mail address. Password: bw https://www.my-gcsescience.com/
- Kerboodle. Username: school e-mail address. Password: (click forgot login to reset). Institution code: Pro9 https://www.kerboodle.com/users/login

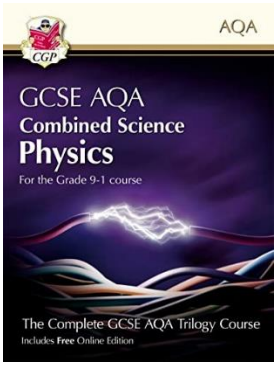
You are encouraged to keep an eye on the news as many reports and articles will be relevant to the materials you are studying in class.

Textbooks

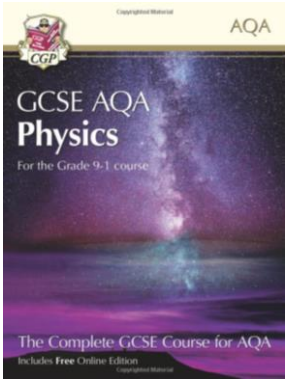
You should have been given one of the below text books. You are expected to bring this to each lesson. You should make use of this textbook whilst revising. Please note to receive your deposit back at the end of year 11 this book needs to be returned in good condition.

Required text book

Grade 9-1 GCSE Combined Science for AQA Physics Student Book with Online Edition by CGP Books



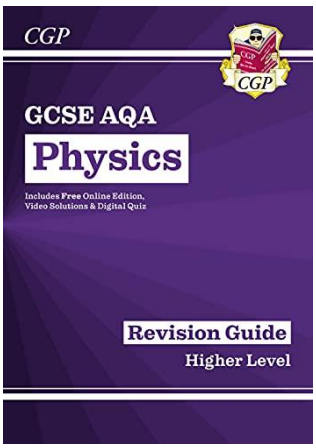
Grade 9-1 GCSE Combined Science for AQA Physics Student Book with Online Edition by CGP Books



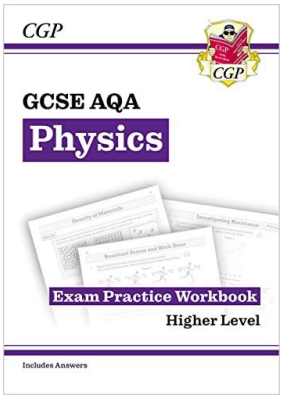
Highly recommended revision books

The below books are not essential but may help you with your revision. A good website to use is https://www.wob.com/en-gb which tends to be cheaper than amazon. Ebay is also a good place to look for books.

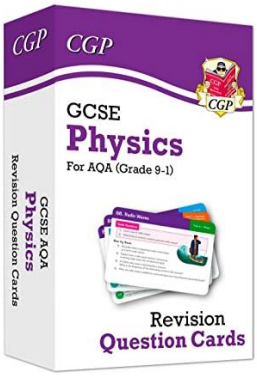
Grade 9-1 GCSE Physics: AQA Revision Guide with Online Edition - Higher by CGP Books



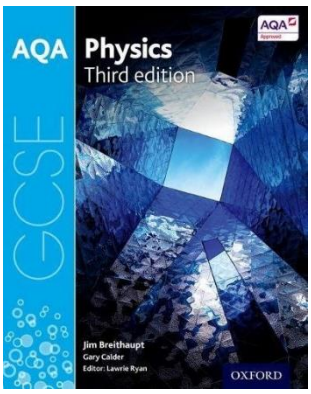
New Grade 9-1 GCSE Physics: AQA Exam Practice Workbook (with answers) - Higher by CGP Books



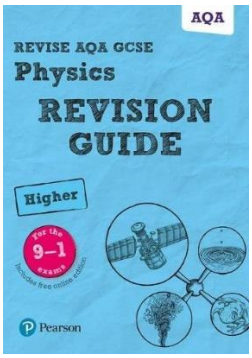
9-1 GCSE Physics AQA Revision Question Cards by CGP Books



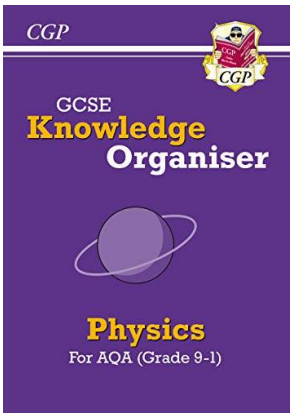
AQA GCSE Physics Student Book by Lawrie Ryan



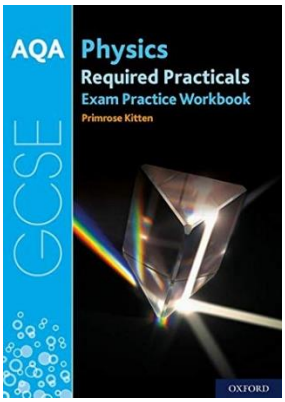
Revise AQA GCSE (9-1) Physics Higher Revision Guide by Mike O'Neill



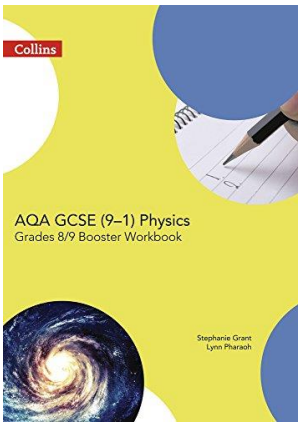
New GCSE Knowledge Organiser: AQA Physics (Grade 9-1) by CGP Books



AQA GCSE Physics Required Practicals Exam Practice Workbook by Primrose Kitten



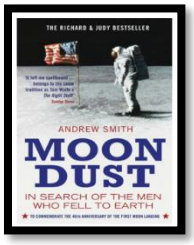
AQA GCSE (9-1) Physics Achieve Grade 8-9 Workbook by Lynn Pharaoh



Reading Recommendations

Kick back this summer with a good read. The books below are all popular science books and great for extending your understanding of Physics

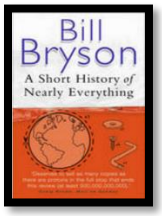
1. **Moondust: In Search of the Men Who Fell to Earth**



ISBN – 1408802384 - One of the greatest scientific achievements of all time was putting mankind on the surface of the moon. Only 12 men made the trip to the surface, at the time of writing the book only 9 are still with us. The book does an excellent job of using the personal accounts of the 9 remaining astronauts and many others involved in the space program at looking at the whole space-race era, with hopefully a new era of space flight about to begin as we push on to put mankind on Mars in the next couple of decades.

https://www.waterstones.com/books/search/term/moondust++in+search+of+the+men+who+fell+to+earth

2. **A Short History of Nearly Everything**



ISBN – 0552997048 - A modern classic. Popular science writing at its best. A Short History of Nearly Everything Bill Bryson's quest to find out everything that has happened from the Big Bang to the rise of civilization - how we got from there, being nothing at all, to here, being us. Hopefully by reading it you will gain an awe-inspiring feeling of how everything in the universe is connected by some fundamental laws.

https://www.waterstones.com/books/search/term/a+short+history+of+nearly+everything

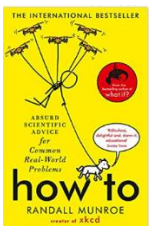
3. **What if**

From the creator of the wildly popular xkcd.com, hilarious and informative answers to important questions you probably never thought to ask.

In pursuit of answers, Munroe runs computer simulations, pores over stacks of declassified military research memos, solves differential equations and consults nuclear reactor operators. His responses are masterpieces of clarity and hilarity, complemented by comics. They often predict the complete annihilation of humankind, or at least a really big explosion.

https://www.amazon.co.uk/What-If-Scientific-Hypothetical-Questions/dp/1848549563/ref=sr_1_3?crid=LWX8WCQHUD5Z&keywords=what+if+question+science+book&qid=1655204783&s=books&sprefix=what+if+question+science+book%2Cstripbooks%2C50&sr=1-3

4. **How to**



For any task you might want to do, there's a right way, a wrong way, and a way so monumentally bad that no one would ever try it. How To is a guide to the third kind of approach. It's full of highly impractical advice for everything from landing a plane to digging a hole

https://www.amazon.co.uk/How-SUNDAY-BESTSELLER-Randall-Munroe/dp/1473680344/ref=sr_1_9?crid=1WNJG4LVKGXSH&keywords=how+to+question+science+book&qid=1655204943&s=books&sprefix=how+to+question+science+book%2Cstripbooks%2C43&sr=1-9

Movie / Video Clip Recommendations

Hopefully you'll get the opportunity to soak up some of the Sun's rays over the summer – synthesising some important Vitamin-D – but if you do get a few rainy days where you're stuck indoors here are some ideas for films to watch or clips to find online.

Science Fictions Films

1. **Moon (2009)**
2. **Gravity (2013)**
3. **Interstellar (2014)**
4. **The Imitation Game (2015)**
5. **The Prestige (2006)**

Online Clips / Series

1. **Minute Physics** – Variety of Physics questions explained simply (in felt tip) in a couple of minutes. Addictive viewing that will have you watching clip after clip – a particular favourite of mine is "Why is the Sky Dark at Night?"

https://www.youtube.com/user/minutephysics

2. **Wonders of the Universe / Wonders of the Solar System –** Both available of Netflix as of 17/4/16 – Brian Cox explains the Cosmos using some excellent analogies and wonderful imagery.
3. **Shock and Awe, The Story of Electricity –** A 3 part BBC documentary that is essential viewing if you want to see how our lives have been transformed by the ideas of a few great scientists a little over 100 years ago. The link below takes you to a stream of all three parts joined together but it is best watched in hourly instalments. Don't forget to boo when you see Edison. (alternatively watch any Horizon documentary – loads of choice on Netflix and the I-Player)

https://www.youtube.com/watch?v=Gtp51eZkwoI

4. **NASA TV –** Online coverage of launches, missions, testing and the ISS. Plenty of clips and links to explore to find out more about applications of Physics in Space technology.

http://www.nasa.gov/multimedia/nasatv/

Summer tasks

Task 1. Revision of ore practicals

The core practicals you will study in GCSE are listed below.

	Required practicals	Topic
14	**Determining specific heat capacity.** Determine the specific heat capacity of a metal block of known mass by measuring the energy transferred to the block and its temperature rise, and using the equation for specific heat capacity.	P2.2
15	**Investigating resistance.** Set up circuits and investigate the resistance of a wire, and of resistors in series and parallel.	P4.2 P4.5
16	**Investigating electrical components.** Correctly assemble a circuit and investigate the potential difference–current characteristics of circuit components.	P4.3
17	**Calculating densities.** Measure the mass and volume of objects and liquids and calculate their densities using the density equation.	P6.1
18	**Investigate the relationship between force and extension for a spring.** Hang weights of known mass from a spring and, using the correct apparatus, measure the resulting extension. Use the results to plot a force-extension graph.	P10.5
19	**Investigate the relationship between force and acceleration.** Using a newton-metre, investigate the effect on the acceleration of an object of varying the force on it and of varying its mass.	P10.1
20	**Investigating plane waves in a ripple tank and waves in a solid.** Determine which apparatus are the most suitable for measuring the frequency, speed, and wavelength of waves in a ripple tank, and investigate waves on a stretched string.	P11.4
21	**Investigating infrared radiation.** Determine how the properties of a surface affect the amount of infrared radiation absorbed or radiated by the surface.	P12.2

Complete the revision activities for Required practical 14, 15, 16 and 19.

Exam Question – Specific Heat Capacity

Success Criteria:

- Describe the equipment that you used.
- Identify what data the equipment is collecting
- Describe the energy transfers that are occurring
- Recall the equation for specific heat capacity
- How do you collect all of the values for the equation?

Command Words:

Describe – Recall the facts, events, or process of an experiment.

Identify – Look at the data or information and describe the patterns shown

$$\Delta E = mc\Delta\Theta$$

Δ = Change in Energy (J)

m = Mass (kg)

c = Specific Heat Capacity (J/kg °C)

ΔΘ = Temperature Change (°C)

Describe an experiment a student can carry out a practical to measure the specific heat capacity of a metal block.

(6 marks)

When answering 6-mark exam questions, remember these key points:

- You do not have to write in full sentences, you may use bullet points
- You will only be marked on your spelling and grammar if it is stated in the question. However, if the examiner cannot understand what you have written, they will not give you the mark.
- Ensure you understand the command word. Only explain if the question has asked you to.
- If there was an equation used, ensure this is mentioned.
- If the question does not give you any numbers, do not create your own imaginary numbers to aid the question. Only do what the questions asked of you.

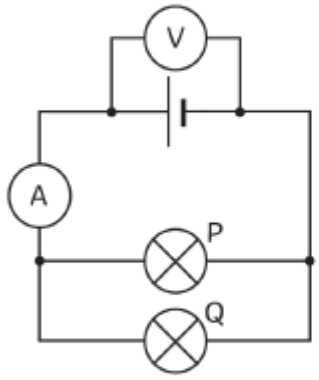
Resistance of a wire

Question 1a

Figure 8 shows a circuit diagram containing two identical lamps arranged in parallel.

The reading of the ammeter is 204mA.

Figure 8



Which statement about the current through the lamps is true?

Tick one box.

The current through both lamp P and lamp Q is 0.204A ☐

The current through both lamp P and lamp Q is 0.102A ☐

The current through both lamp P and lamp Q is 0.051A ☐

The current through both lamp P and lamp Q is 0.075A ☐

(1 mark)

Question 1b

One of the lamps breaks and is removed but nothing is put in its place. What is the current in the other lamp?

Which statement about the current through the lamps is true?

Tick one box.

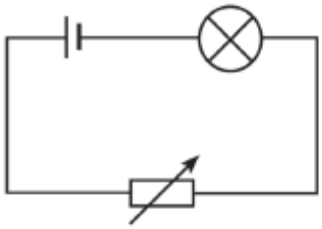
The current through both lamp is 0.204A ☐

The current through both lamp is 0.102A ☐

The current through both lamp is 0.051A ☐

The current through both lamp is 0.075A ☐

(1 mark)



Question 1c

A lamp is set up in series with a variable resistor.

Explain what happens to the lamp if the resistance is increased.

(2 marks)

Question 1d

What is the equation for Ohm's Law? _____

(1 mark)

Question 1e

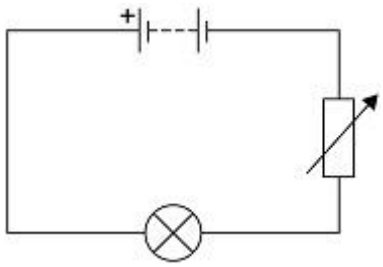
Using Ohm's Law, calculate the resistance of a lamp if the current is 0.16 Amps and the potential difference across it is 4 Volts

(3 marks)

Q1.

A student investigated how the current in a filament lamp varied with the potential difference across the filament lamp.

The diagram below shows part of the circuit used.

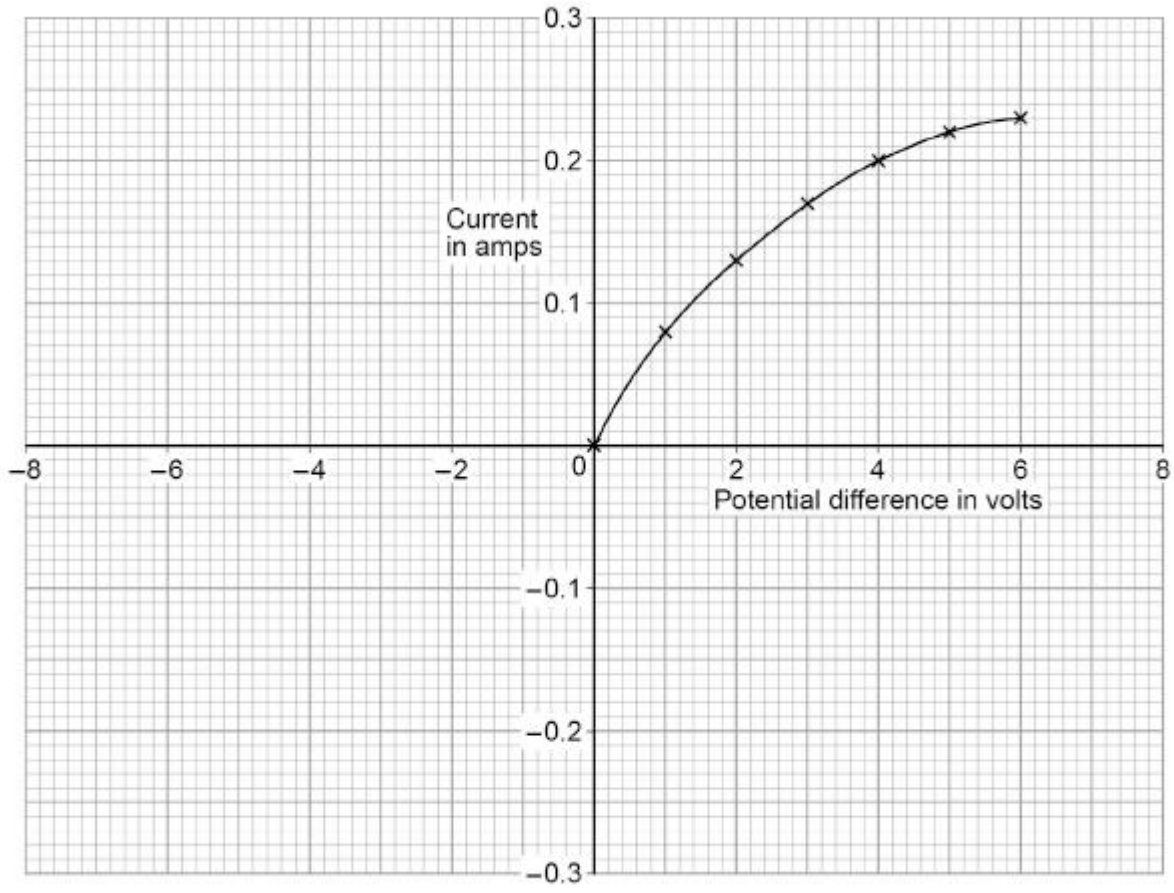


(a) Complete above diagram by adding an ammeter and a voltmeter.

Use the correct circuit symbols.

(3)

The graph below shows some of the results.



(b) The student reversed the connections to the power supply and obtained negative values for the current and potential difference.

Draw a line on the graph to show the relationship between the negative values of current and potential difference.

(2)

(c) Write down the equation which links current (I), potential difference (V) and resistance (R).

_____

(1)

(d) Determine the resistance of the filament lamp when the potential difference across it is 1.0 V.

Use data from the graph above.

_____

_____

_____

_____

Resistance = _____ Ω

(4)

(e) A second student did the same investigation. The ammeter used had a zero error.

What is meant by a zero error?

_____

_____

(1)

(Total 11 marks)

Acceleration

Organise the method used to obtain results on acceleration:

- Connect the light gates to the interface and computer. Start the software for timing, telling the computer the length of card.
- Place the air track on a bench and attach it to the vacuum cleaner, set on 'blow'.
- Tie a length of string to the glider. Pass the string over the pulley and attach the weight stack to the other end of the string.
- Make sure the string is horizontal and is in line with the air track.
- Clamp the two light gates horizontally. Position them above the so that the card passes through them as the glider moves.
- Switch on the vacuum cleaner. The glider should accelerate thro light gates as the weight falls to the ground.
- Place a glider with a piece of card attached on the air track and s on the vacuum cleaner. The glider should lift up off the air track free to move.

Risk Assessment:

Suggest what the risks are in this experiment. Describe what you should do to minimise the risks.

Variables

In the experiment, suggest what the following are:

Independent Variable:

Dependent Variable:

Two Control Variables (include how they are to be controlled)

1.

2.

Acceleration

Formula
Acceleration = change in velocity/time

Complete the following calculations:

1. A mass accelerates from rest to 4 m/s in 8 seconds. What is the acceleration?
2. A mass accelerates from 2m/s to 8 m/s in 2 seconds. What is the acceleration?
3. A mass decelerates from 100 m/s to 50 m/s in 10 seconds. What is the deceleration?

Force = mass x acceleration

Plan

Without turning over (!) write a step by step plan for measuring the acceleration of an object.

Looking for Correlations

Force (N)	Acceleration (m/s/s)
0.2 N	0.8 m/s/s
0.4 N	1.6 m/s/s
0.6 N	2.4 m/s/s
0.8 N	3.2 m/s/s
1 N	4.0 m/s/s

As the force increases...

Is the graph proportional?

What does this mean?

Complete the sketch graph

Task 2. Complete the exam questions

Q1.

A student investigated how the current in a circuit varied with the number of lamps connected in parallel in the circuit.

Figure 1 shows the circuit with three identical lamps connected in parallel.

Figure 1

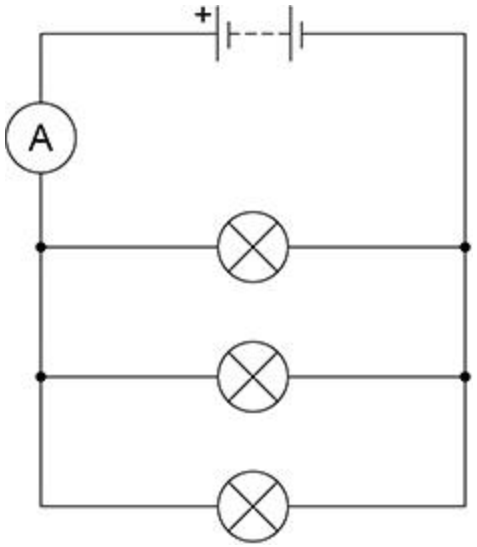
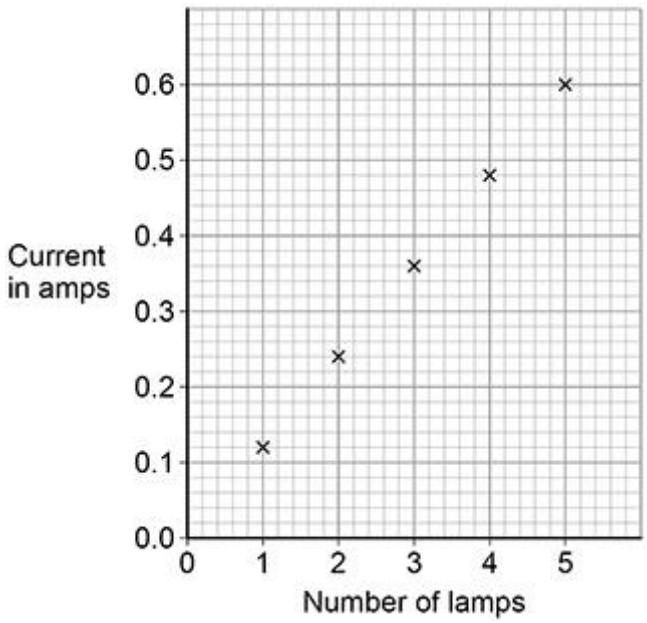


Figure 2 shows the results**.**

Figure 2



(a) Complete the sentences.

Choose answers from the box.

Each answer can be used once, more than once or not at all.

decreased	**stayed the same**	**increased**

As the number of lamps increased, the current _____.

As the number of lamps increased, the total resistance of the circuit _____ .

As the number of lamps increased, the potential difference across the battery _____ .

(3)

(b) When there were three lamps in the circuit the ammeter reading kept changing between 0.35 A and 0.36 A.

What type of error would this lead to?

Tick (✓) **one** box.

Random error ☐

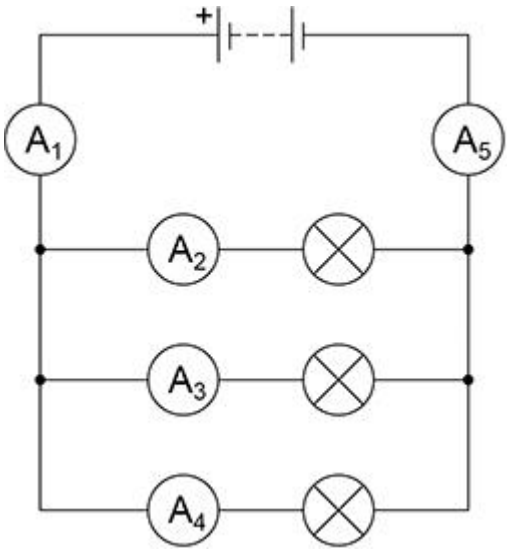
Systematic error ☐

Zero error ☐

(1)

Figure 3 shows a circuit with five ammeters and three identical lamps.

Figure 3



(c) Complete the table below to show the readings on ammeters A_2 and A_5.

Ammeter	**A_1**	**A_2**	**A_3**	**A_4**	**A_5**
Current in amps	0.36		0.12	0.12	

(2)

(d) The resistance of one lamp is 15 Ω.

The current in the lamp is 0.12 A.

Calculate the power output of the lamp.

Use the equation:

$$\text{power} = (\text{current})^2 \times \text{resistance}$$

_____

_____

_____

Power = _____ W

(2)

(Total 8 marks)

Q2.

A student investigated the density of different fruits.

The table below shows the results.

Fruit	**Density in g/cm^3**
Apple	0.68
Kiwi	1.03
Lemon	0.95
Lime	1.05

(a) The student determined the volume of each fruit using a displacement can and a measuring cylinder.

What other piece of equipment would the student need to determine the density of each fruit?

_____

(1)

(b) Write down the equation which links density (ρ), mass (m) and volume (V).

_____

(1)

(c) The mass of the apple was 85 g.

The density of the apple was 0.68 g/cm^3.

Calculate the volume of the apple.

Give your answer in cm^3.

_____

_____

_____

_____

_____

Volume = _____ cm^3

(3)

(d) The student only measured the volume of each fruit once.

The volume measurements **cannot** be used to show that the method to measure volume gives precise readings.

Give the reason why.

_____

_____

_____

(1)

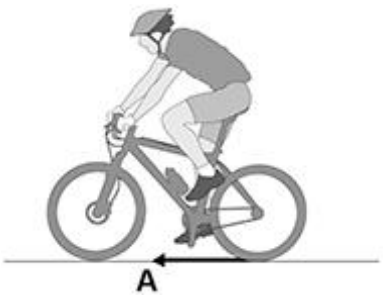
(Total 6 marks)

Q3.

Figure 1 shows a cyclist riding a bicycle.

Force **A** causes the bicycle to accelerate forwards.

Figure 1



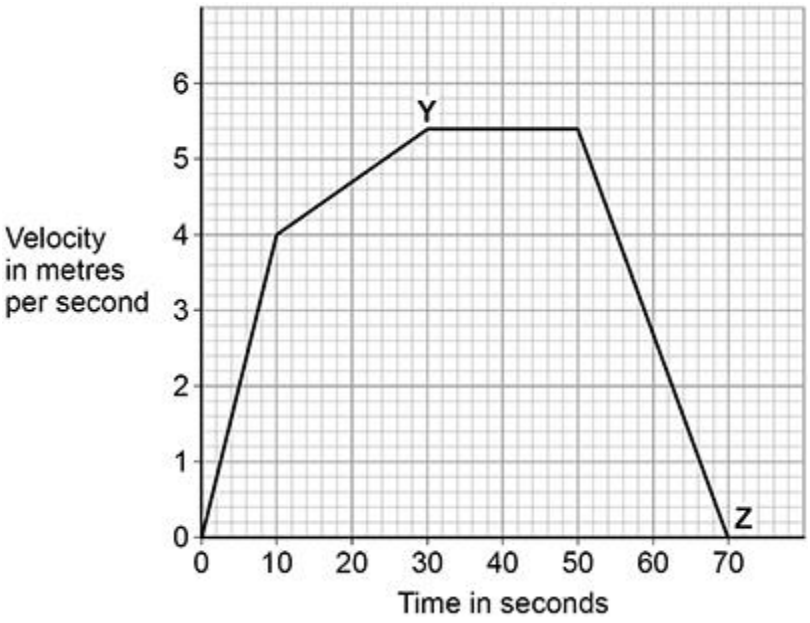
(a) What name is given to force **A**?

_____

(1)

Figure 2 shows how the velocity of the cyclist changes during a short journey.

Figure 2



(b) Determine the distance travelled by the cyclist between **Y** and **Z**.

_____

_____

_____

_____

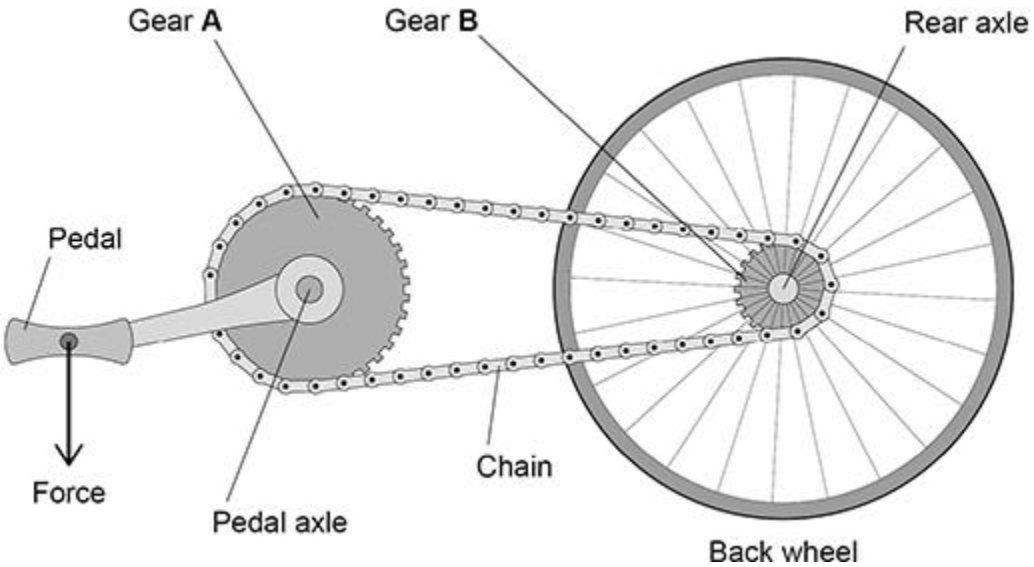
_____

Distance travelled by the cyclist between **Y** and **Z** = _____ m

(3)

(c) **Figure 3** shows the gears on the bicycle.

Figure 3



Describe how the force on the pedal causes a moment about the rear axle.

_____

_____

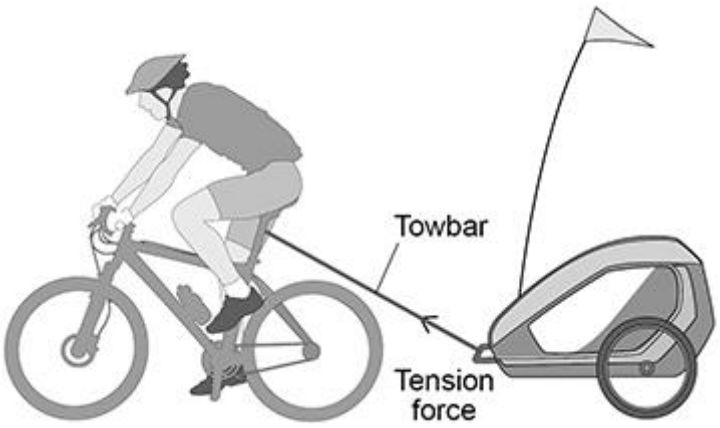
_____

_____

(2)

Figure 4 shows a different cyclist towing a trailer.

Figure 4



(d) The speed of the cyclist and trailer increased uniformly from 0 m/s to 2.4 m/s.

The cyclist travelled 0.018 km while accelerating.

Calculate the initial acceleration of the cyclist.

_____

_____

_____

_____

Acceleration = _____ m/s^2

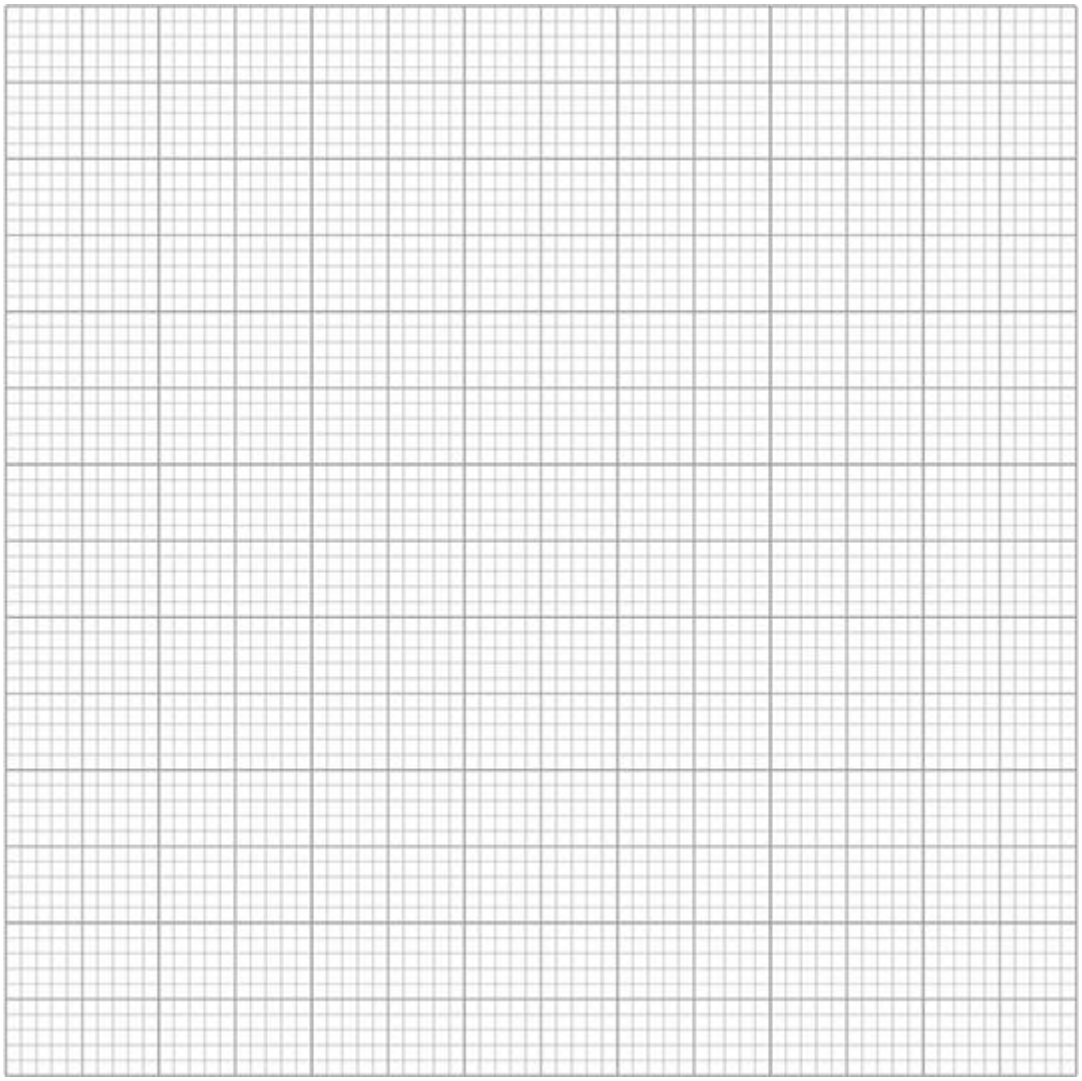
(3)

(e) The resultant force of the towbar on the trailer has a horizontal component and a vertical component.

horizontal force = 200 N

vertical force = 75 N

Determine the magnitude and direction of the resultant force of the towbar on the trailer by drawing a vector diagram.



Magnitude of force = _____ N

Direction of force = _____ degrees

(4)

(Total 13 marks)

Task 3. Prepare for your first topic

Your first topic back will be waves. Produce two A4 pages of Cornell notes on waves.

Cornell Notes	Topic/ Objective:	Name:
		Class/Period:
		Date:

Essential Question:

Questions:	Notes:

Summary:

Cornell Notes	Topic/ Objective:	Name:
		Class/Period:
		Date:

Essential Question:

Questions:	Notes:

Summary:

Specific heat capacity

Mark Scheme

0 Marks

Nothing relative in answer

1 – 2 Marks

Recall the use of the correct equipment. Listed the equipment used but has not placed them in the correct order. Explains the correct use of the SHC equation

3 – 4 Marks

Recall the use of the correct equipment. Listed the equipment in the correct order but may have missed some steps. Explained how to use the equipment to obtain the information relevant to the SHC equation.

5 – 6 Marks

Correctly recalled and listed the equipment in the correct order of use. Correctly described how these are used to obtain all the values of the SHC equation. The description of what to do may be followed by another student to obtain the same results.

- **Mass measured using a balance**
  - **Reference must be made to zeroing of the balance**
- **Describe how energy is transferred from the rod heater to the metal block**
- **Voltmeter, Ammeter, and Stopwatch values are used to calculate the energy transferred**
- **Recall the Specific Heat Capacity equation and how all the values are obtained**

Resistance of a wire

Question	Answers	Extra Information	Mark
1a	0.102A	Note the units - covering mA to A	1
1b	0.102A		1
1c	increasing the resistance decreases the current therefore the lamp will be dimmer		1 1
1d	potential difference = current x resistance	accept correct rearrangement with R as subject	1
1e	4= 0.16 x R R= 4/0.16 (Ω) R= 25 (Ω)	Allow 25Ω with no working shown for full marks.	1 1 1

Q1.

(a) ammeter and voltmeter symbols correct

1

voltmeter in parallel with lamp

1

ammeter in series with lamp

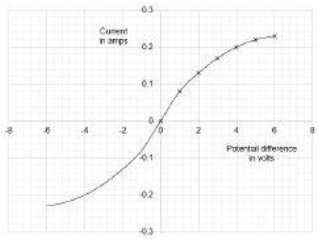
1

(b) smooth curved line of correct shape

do not accept a line that becomes horizontal

1

passing through - 4.0 V, - 0.2 A
or
– 6.0 V, - 0.23 A



2nd mark conditional on scoring 1st mark

1

(c) potential difference = current × resistance
or
V = IR

1

(d) I = 0.08 (A)

1

1.0 = 0.08 × R

allow 1.0 = their I × R provided their I has been obtained from the graph

1

$R = \frac{1.0}{0.08}$

allow R = $\frac{1.0}{\text{their I}}$

1

R = 12.5 (Ω)

allow an answer consistent with their I

1

(e) ammeter displays a reading when not connected (to a circuit)

1

[11]

Mark schemes

Q1.

(a) increased

1

decreased

1

stayed the same

1

(b) random error

1

(c) $A_2 = 0.12$ (A)

1

$A_5 = 0.36$ (A)

1

(d) $P = 0.12^2 \times 15$

1

$P = 0.216$ (W)

1

[8]

Q2.

(a) balance / scales

1

(b) $\text{density} = \frac{\text{mass}}{\text{volume}}$

or

$\rho = \frac{m}{V}$

1

(c) $0.68 = \frac{85}{V}$

1

$V = \frac{85}{0.68}$

1

$V = 125$ (cm^3)

1

(d) repeat readings (of volume) need taking (of each fruit) to show that the readings are

close together

allow 'the same' for 'close together'

1

[6]

Q3.

(a) friction

1

(b) (area of rectangle =) 108 (m)

1

(area of triangle =) 54 (m)

1

(total area / distance =) 162 (m)

allow a correctly calculated total area / distance from an incorrectly calculated area of rectangle and / or triangle

1

(c) (the force on the pedal) causes a moment about the pedal axle

1

which causes a force on the chain (which causes a moment about the rear axle)

allow gear B for chain

1

(d) $2.4^2 (- 0^2) = 2 \times a \times 18$

1

$$a = \frac{2.4 \times 2.4}{36}$$

1

$a = 0.16$ (m/s^2)

1

<u>alternative method</u>

t = 18 / 1.2
t = 15 (s) (1)

a = 2.4 / 15 (1)

this mark may be awarded if the time is incorrectly calculated

a = 0.16 (m/s^2) (1)

allow a correctly calculated acceleration from an incorrectly calculated time 1

(e) horizontal (200N) **and** vertical (75N) forces drawn to the same scale

1

resultant force drawn in the correct direction

shown by an arrow head from bottom right to top left

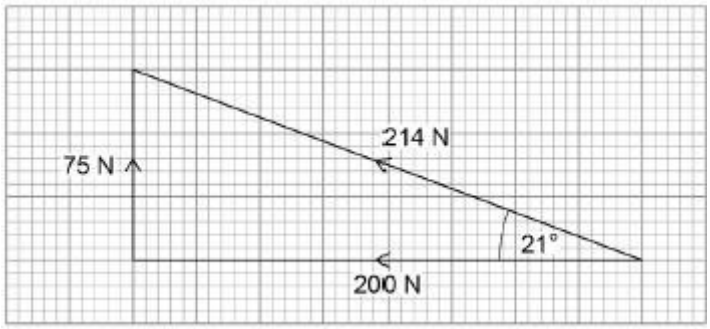
1

resultant force with a value in the range 212 to 218 (N)

allow a calculated value of 213.6 ***or*** *214 (N)*

1

direction in the range 20–22 (degrees from the horizontal)



allow 68–70 (degrees from the vertical)

allow a bearing in the range 290–292

to gain full marks a vector diagram must have been drawn

1

[13]