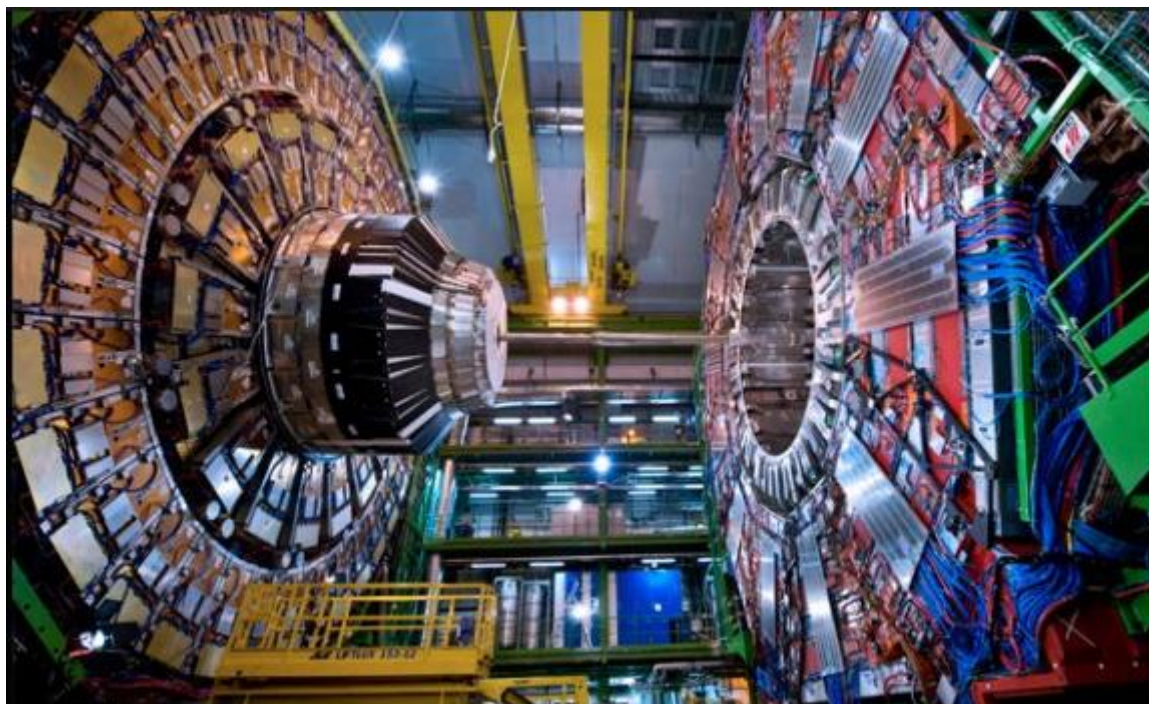


A' Level Physics Induction 2022-23



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# Hammersmith Academy Physics Department

## Welcome to Physics!

It is fair to say that the AS Physics course is a significant step up from GCSE. After a two month break it can often be quite a shock to the system. Therefore, this pack has been designed to help you bridge the gap from GCSE to AS Level. The aim is to ensure that you understand what you've let yourself in for and to make sure that you are truly ready for your new course in September.

You will start by looking at the topics covered in the Year 12 OCR 'Physics A' course, which will give you an idea of how the course will be structured and what resources are available. I have also included some provisional details of when you will be doing the examinations.

After this you will review what you already know and be given some work to do to make sure you are ready to start in September to give yourself the best chance of success.

## What can you do with your A Level?

With an A level in Physics you will have proved that you possess a wide range of Key Skills, exactly what employers and universities are looking for today. There can be few subjects at A level that cover such a wide range of transferable skills – from the **use of IT** in data-logging experiments; to the **numerical skills** that are the bedrock of the subject, essential in **problem-solving** and in **practical work**; to skill in **written expression** needed to produce clear, concise explanations. All the technology that surrounds us is based on the principles of physics, so if you are considering working in any area related to technology from music to medicine, or lasers to law – studying physics is an essential first step.

## Organising your learning

In September you will be issued with an exercise book for note-taking and an official OCR Practical workbook. The practical books will remain in the class and they are to be kept neat and tidy.

In addition to this, students will be given a manila folder. In this folder you will need some dividers for the relevant modules and extra materials that shall be supplied throughout the course. If there are any problems with getting this, please see Mr Savvidis.

## How hard is this Physics Course going to be?

Physics is one of the toughest A' Levels to have chosen! It will be hard work and those that work the hardest, do the best. Over the course you will have a minimum of 5 hours of lessons per week (plus an additional 4 hours of study per week). In these lessons you will cover all the theory and practical skills that you will need for the assessment pieces.

However, there is plenty of support that will be given outside of these lessons too. I personally like to communicate with parents and students at A Level via email, SatchelOne and SharePoint and shall do so frequently. Therefore, after the first option of going to see your teachers in person you can always email us. My email address is [ssavvidis@hammersmithacademy.org](mailto:ssavvidis@hammersmithacademy.org) and Mr Steel's email address is [asteel@hammersmithacademy.org](mailto:asteel@hammersmithacademy.org)

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### Additional support and expectations for starting the AS Physics Course includes:

#### • Reading before a lesson

You will be expected to read up in the on-line Kerboodle textbook about the next lesson's topic and to attend that lesson with questions that you have not understood from your reading. This maximises the effectiveness of our learning time.

#### • Reading after a lesson

Once your notes have been completed from a lesson, you will be expected to spend time in your non-contact periods, and at home, consolidating your notes, by re-reading them and adding additional information so that you fully understand each topic. Anything you do not understand after this consolidation should be written down and brought as questions to your next lesson. Additionally, you should read around the subject, taking an interest in latest developments and going beyond the specification. By doing this broader reading you reinforce your use of key terminology, your understanding of key topics and improve your ability to do well in University interviews for Physics and Physics related courses.

#### • Notes and Practise Exam Questions

You will be expected to make notes in lessons, complete homework tasks and to organise these in a folder. Throughout the course you shall also be given example exam questions to complete as we cover each topic. These should be kept and filed away too. Please read the information at the end of this booklet to see one particularly effective method of note-making, called the "Cornell method".

#### • Websites

[Physics - Physics Home \(sharepoint.com\)](#): The entire physics course is available on our internal SharePoint. Here you can access the PowerPoints and resources that will be used in lessons, the Scheme of Learning telling you what is being taught and when. You can read ahead and you have access to a range of videos (showing practicals and other important content)

[Satchel One | Login](#): This is where all your homework and assignments will be issued. Download the app and this will help you manage your workload across all subjects during the week.

<http://www.ocr.org.uk/qualifications/as-a-level-gce-physics-a-h156-h556-from-2015/> is the OCR Physics website where materials shall be published as they get released; such as example papers etc.

<https://isaacphysics.org/> This website has been developed by Cambridge University and is full of questions that will develop your problem-solving skills.

<https://www.physicsandmathstutor.com/> A great resource for past exam questions which can be downloaded as full papers or as questions by topic.

<https://www.alevelphysicsonline.com/> - The Whole AS Level Physics course is available on video. AS material is freely available but A2 work can be accessed using.

<https://uplearn.co.uk/> Uplearn contains the whole A Level course and is an AI enabled course with videos that explain concepts, questions that check recall, concepts and past exam questions. Every student who enrolls at HA will be given free access (worth £250 per student per year) to this course to support their in-class studies.

<http://freevideolectures.com/University/Stanford/Physics/Subject/Page1#> Stanford University offer online lectures about a range of current, interesting physics.

<https://phet.colorado.edu/> Phet Animations are interactive simulations for a better understanding of a range of physics concepts.

<http://www.science-spark.co.uk/ks5.html> has been written specifically for the course you will be studying and has lessons, notes, questions, answers and links to other resources on the web.

<http://www.sixtysymbols.com/> Sixty Symbols is a website run by Nottingham University's Physics Department that has short 10 minute videos for a range of Physics concepts that are covered in the AS course.

Gorilla physics: <https://www.youtube.com/channel/UCDWYbR94ZYFUXd4NJvAHYQ>

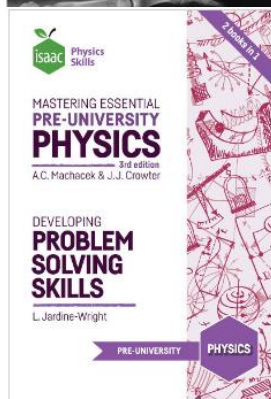
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### • Textbooks

You are provided with an electronic textbook, via Kerboodle which you will be able to access once you have enrolled and have an academy email address. These books have notes, questions and revision tips and quizzes to help you along the way. The book is here if you would like to purchase a hard copy for home:

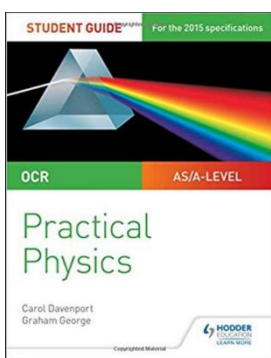


Paperback: 656 pages  
Publisher: OUP Oxford; UK ed. edition (2 July 2015)  
Language: English

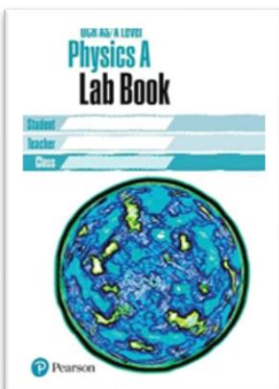


This book will be given to you as part of the course and contains a bank of questions that must be completed by the end of the course. It works in conjunction with the Isaac Physics Website.

3rd Edition (2019-)



This book allows students to get to grips with the core practicals and to develop the skills that are needed to succeed with an in-depth assessment driven approach.



This lab book includes:

- all the instructions students need to perform the Core Practical, consistent with our A level online teaching resources
- writing frames for students to record their results and reflect on their work
- CPAC Skills Checklists, so that students can track the practical skills they have learned, in preparation for their exams
- practical skills practice questions
- -a full set of answers.

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### **Revision Guides**

We would encourage you to buy one as soon as possible. I always recommend the CGP Revision Guides and they are available for the new A Level Physics Course.

- **Revision Methods**

See Appendix 2 for a range of revision strategies.

- **Specification**

Read through this to check your progress and your breadth of knowledge against what you are expected to know.

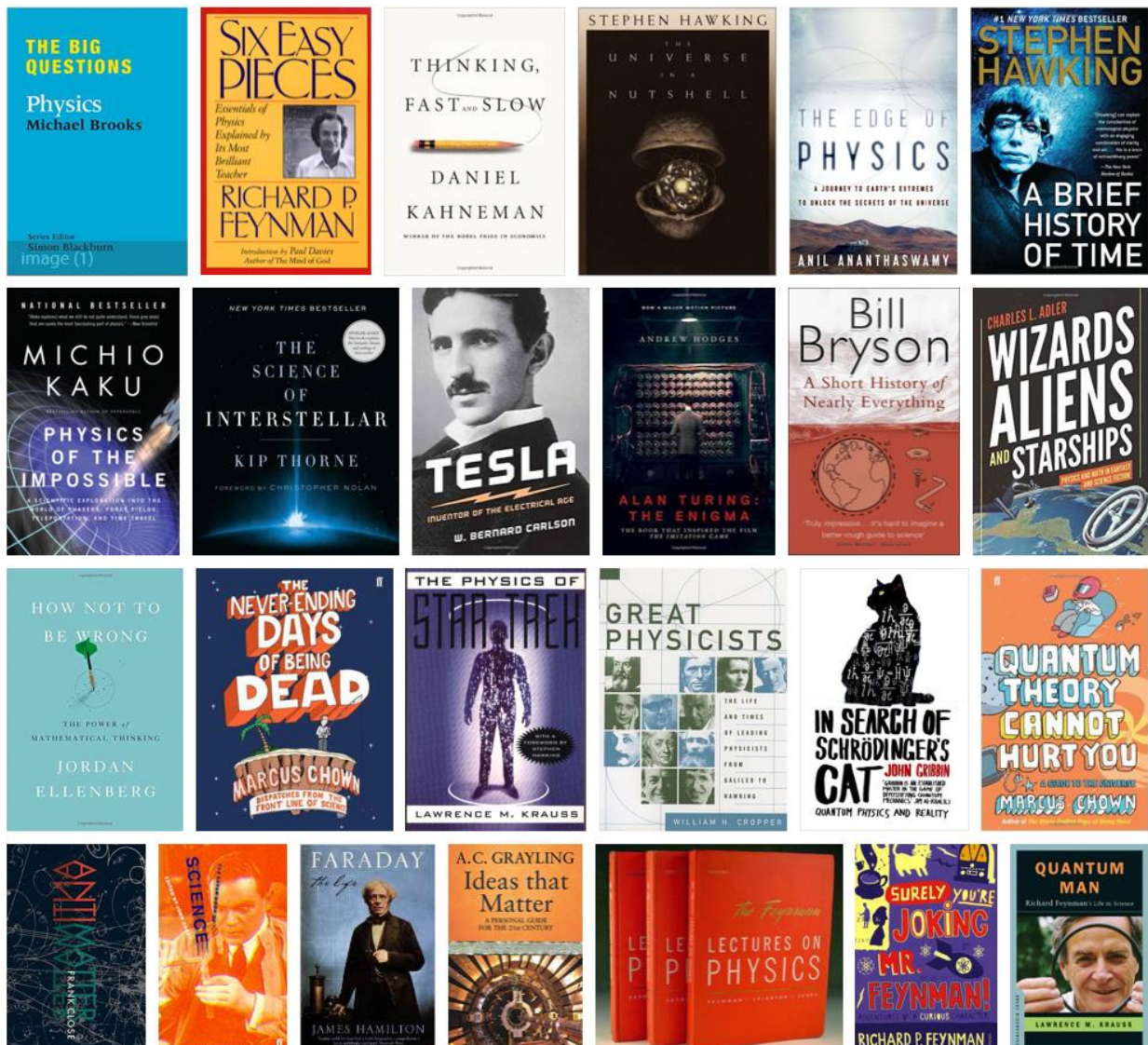
[AS and A Level - Physics A - H156, H556 \(from 2015\) - OCR](#)

## Hammersmith Academy Physics Department

### • Recommended Reading Books

The Top Ten Books that I recommend really challenge your perception of the world and it's limits. These books can show you how far and close to achieving remarkable, once deemed impossible, things we actually are. There are many more books you could read depending on which area of Physics you enjoy. However, for now try these:

1. The Uncle Albert Series – Russell Stannard
2. What If?: Serious Scientific Answers to Absurd Hypothetical Questions – Randall Munroe
3. Six Easy Pieces – Richard Feynman
4. A Short History of Nearly Everything – Bill Bryson
5. Seven Brief Lessons on Physics – Carlo Rovelli (also The Order of Time)
6. The Human Universe – Professor Brian Cox
7. The Big Bang – Simon Singh
8. Can You Solve My Problems? – Alex Bellos
9. Enlightenment Now – Stephen Pinker
10. Antimatter – Frank Close



## Hammersmith Academy Physics Department

### Course Information

Course Title	AS / A2 Level Physics	Exam Board	OCR 'A'
Module	Title	Weighting	Assessment Method
H156/1	Breadth in Physics	50%	1 ½ Hour Written Exam
H156/2	Depth in Physics	50%	1 ½ Hour Written Exam
H156/4	Practical Endorsement in Physics	Reported by School Not formally Assessed	
H556/1	Modelling Physics	37%	2 ¼ hours Written exam
H556/2	Exploring Physics	37%	2 ¼ Hour Written Exam
H556/3	Unified Physics	26%	1 ½ Hour Written exam

### Provisional Exam Dates

*Please be aware these are only provisional and are subject to change if the exam board decides.*

Module	Date of Exam	Time of the Exam
Breadth in Physics (H156/1)	tbc	tbc
Depth in Physics (H156/2)	tbc	tbc
Modelling Physics (H556/1)	tbc	tbc
Exploring Physics (H556/2)	tbc	tbc
Unifying Concepts (H556/3)	tbc	tbc

### The Module Breakdown and where they are examined.

Content is split into six teaching modules:

Module 1 – Development of practical skills in physics

Module 2 - Foundations of physics

Module 3 – Forces and motion

Module 4 – Electrons, waves and photons

Module 5 – Newtonian world and astrophysics

Module 6 – Particles and medical physics

**Breadth of Physics** – Modules 1-4 (All AS content is examined in this paper)

**Depth of Physics** – Module 1-4 (All AS content is examined in this paper)

**Modelling Physics** – Module 1, 2, 3 and 5 is examined in this paper

**Exploring Physics** – Modules 1, 2, 4 and 6 are examined in this paper

**Unified Physics** – Modules 1-6 are examined in this paper.

# Hammersmith Academy Physics Department

## Summer Induction Work – Physics

As much as you should enjoy your very long summer holidays, you shall be expected to complete the summer homework task. This was emailed to you and is also here:

### **A' Level Physics Summer Work (2022-23)**

#### **Hammersmith Academy**

Dear Physicists,

Please find a series of tasks that you **must complete** over the summer prior to starting the course.

This work is part of the induction process and completion is required for entry onto the physics program at Hammersmith Academy.

<https://isaacphysics.org/account?authToken=NKYU9E>

1. Copy and paste this link into your internet browser.
2. Set up your Isaac Physics account. You will use this account throughout the course.
3. Click on "Menu"
4. Complete all the set assignments:

#### **Skills (AS Level)**

- A1. Using and Rearranging Equations
- A2. Derived and Base Units
- A3. Standard Form and Prefixes
- A4. Converting Units
- A5. Gradients and Intercepts of Graphs
- A6. Equations of Graphs
- A7. Area under the line of a Graph 1
- A8. Area under the line for a Graph 2
- A9. Factor and Percentage change
- A10 Proportionality

#### **Mechanics (GCSE):**

- 8. Speed, Distance and Time,
- 8a. Additional Speed, Distance and Time Questions
- 9. Displacement and Distance
- 10. Motion Graphs: Displacement –Time
- 11. Acceleration
- 12. Motion Graphs: Velocity-Time
- 13. Resultant Force and Acceleration
- 13a. Additional Resultant Force and Acceleration.
- 14. Terminal Velocity

These assignments will take about 12 hours to complete. You should complete them in plenty of time over the course of your summer holiday.

If you have any problems accessing the site then you must contact me at [ssavvidis@hammersmithacademy.org](mailto:ssavvidis@hammersmithacademy.org)

Best of luck

See you in September.

Mr Savvidis & Mr Steel : Physics teachers at Hammersmith Academy.



[Appendix 1](#)

**A WIDELY RECOGNIZED SYSTEM OF NOTE TAKING** that is commonly taught to university students is the Cornell method, developed by Dr. Walter Pauk, a Cornell University professor. The Cornell system is not really a method of taking or recording notes; it is more a system for organizing your notes into an effective study guide. The Cornell system promotes active learning and critical thinking, providing a method by which you can increase your comprehension of class material. There are five stages involved in the Cornell note taking method.



**Stage 1: RECORD**

Prepare for this stage by drawing a vertical line about 2 ½ inches from the left edge of your paper. The **left column** is your **recall column**, which you leave blank until Stage 2. The right, larger column is where you will record important information from the lecture. You can use an outline or paragraph format. Include diagrams, illustrations, questions/answers provided by the professor during her lecture.

recall column	<b>record your lecture notes in the right, larger column</b>
	<i>Photosynthesis</i> <i>January 24</i>

**Stage 2: REDUCE**

As soon after class as you can, review and condense your notes. This reduction stage increases your understanding and recall. Reviewing lecture material within 24-48 hours of the lecture can increase how much material you remember by approximately 80%. Another way of looking at this is that if you fail to review within 24-48 hours of the lecture, you will forget approximately 80% of the material. This means that you have to spend additional time relearning the information prior to a test.

Write key words and phrases in the recall column to summarize main points of the lecture. Use as few words as possible. Include questions that help you to clarify unclear ideas or to elaborate on your lecture notes by connecting ideas together. Develop potential test questions that you think the professor could ask you relating to the lecture information. Finally, summarize the lecture in your own words. Summarizing information is another way of reviewing and critically thinking about what you have learned. Preparing summaries in your own words helps you identify what you know and understand, as well as making very obvious the information for which you need additional clarification from professor or study partners.

Note Taking: Cornell Method

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<i>Climate classification</i>	I. <i>System of climate classification</i>
<i>Koppen</i>	A. <i>Invented by Vladimir Koppen: botanist who saw biological activities as a function of climatic characteristics</i>
<i>What did he do? Why imp.?</i>	B. <i>created a climograph</i>
<i>Define climograph</i>	** <i>Displays mo'ly temp. and precip. on 1 graph</i>
<i>How do you calculate problem on a climograph?</i>	C. <i>main concern: make it simple</i>
<i>Give example.</i>	* <i>rel'ship between potential evap. &amp; amt. of mois. rec'd at any geo. location</i>
	II <i>Arctic climates: ET &amp; EF</i>
<i>list/define E Climates</i>	E: <i>avg. mo. temp. &lt;50</i>
<i>Characteristics?</i>	ET: <i>avg. temp. warmst mo. 50F &amp; &lt;32F</i>
	* <i>tundra or continental subarctic</i>
	EF: <i>avg. temp. in warmst mo. &lt;32F</i>
	* <i>ice cap or arctic</i>
<i>Define humid dry boundary</i>	III <i>Humid Dry Boundary</i>
<i>How calculated?</i>	A. <i>Marks maj. diff. between humid &amp; dry climate regime</i>
<i>Example?</i>	B. <i>Must know how boundary calculated</i>
<p><b>Summary:</b> <i>Koppen was a botanist who invented a system of climate classification. He believed that characteristics of climate determined biological activities <b>such as</b>?????. To classify climates, he developed the climograph, which displays variables of monthly temp. and precip. We are looking at the relationship between potential evaporation and amt of moisture received at a particular geographic location. E-type climates are locations where avg. mo. temps are less than 50. Precip. is received, but comes as snow. ET climates are tundra or continental subarctic; warmest mo. = temps of 50-32F. EF climates are ice cap or arctic; warmest mo. =below 32F.</i></p>	

### Stage 3: RECITE

During this stage, you cover your notes and try to say what is in them in your own words. Cover up the right-hand column where you recorded your notes and use the key words and phrases in the recall column to trigger your memory. If you have difficulty recalling the information successfully, do another review of your lecture notes.

### Stage 4: REFLECT

After reviewing and reciting your notes, give yourself some "wait time". Then, reread your notes and think about them. Read your text to supplement and clarify your notes. Use your text and lecture notes to discover the causes and effects of issues, define terms, and relate concepts. Make generalizations and draw conclusions. Create a brief summary of the entire lecture. This helps you to become a more active, critical thinker.

### Stage 5: REVIEW

Briefly review your notes several times a week to retain what you have learned. "Distributed review" results in repetition of the information, which keeps it fresh and decreases your chances of forgetting what you have learned.

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## Appendix 2

### 1.Highlighting Notes

Is an ineffective revision method, but looks nice!

### 2.Reciting

Research shows that Note-taking and Re-reading notes are less effective than carrying out a “Read, recite, review” (3R) practice.

The learner-controlled testing method that we implemented in this study required learners to read the text, set the text aside and recite out loud all that they could remember, and then read the text a second time (the read-recite-review strategy, termed 3R). This strategy is a truncated version of Robinson’s (1941)

The 3R practice shows even more effectiveness when followed up by testing (practice questions).

The official benefits are set out below:

#### Discussion

Using longer and more complex passages than in Experiment 1, we again found that the 3R strategy had benefits for immediate and delayed recall, relative to both note taking and rereading only. A new finding in Experiment 2 is that the 3R strategy, relative to rereading only, yielded benefits for multiple-choice performance (on a test that included inference questions) and for problem solving. Thus, the consequences of 3R go beyond boosting performance on a criterial test that parallels recitation (i.e., free recall).

### 3.Graphic organizers

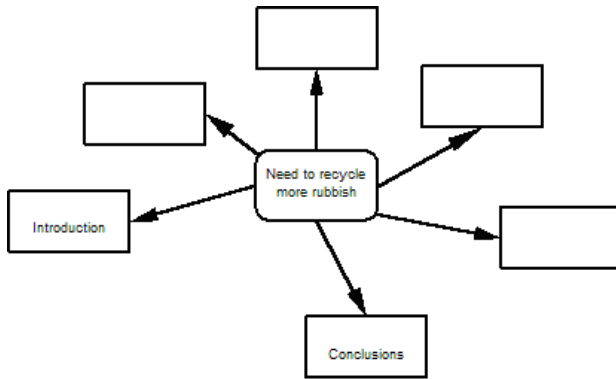
#### Venn diagrams

Used for comparative thinking



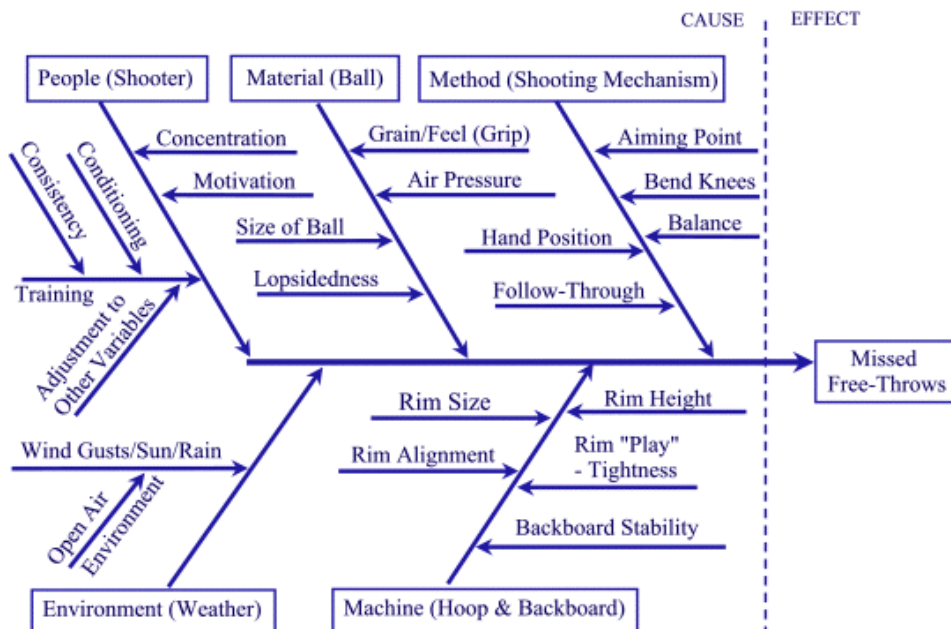
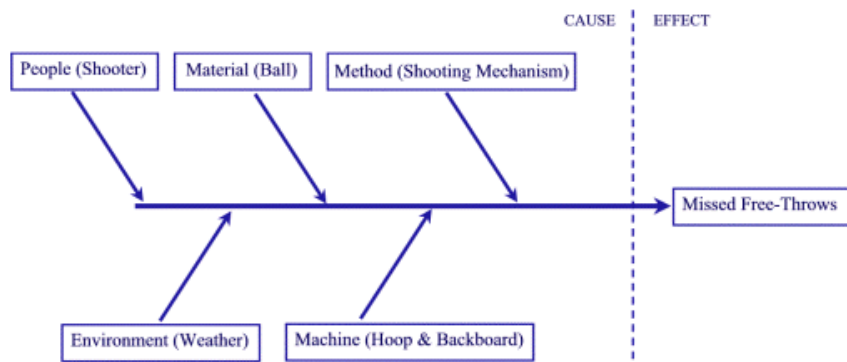
**Spider Diagram**

Used for classifying/sequencing



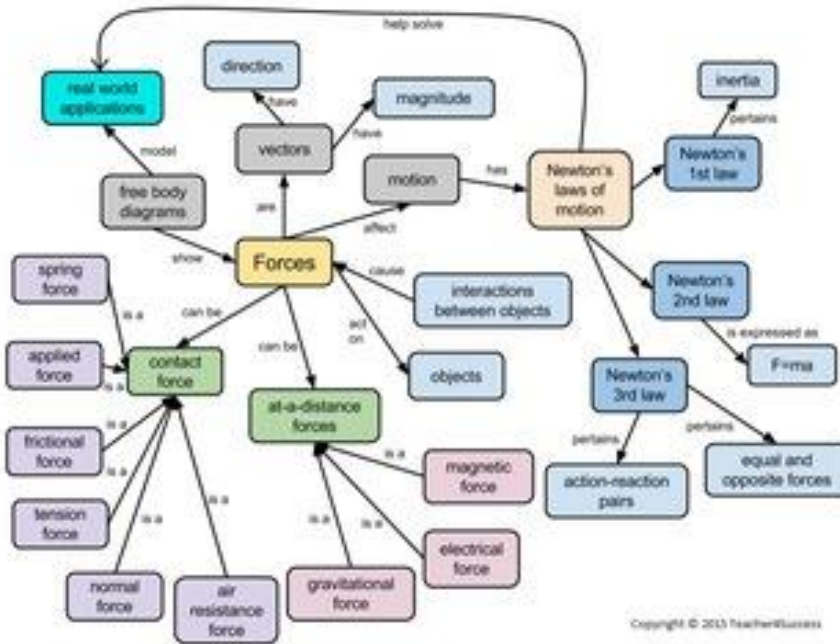
**Fishbone Diagrams**

Used to show cause and effect

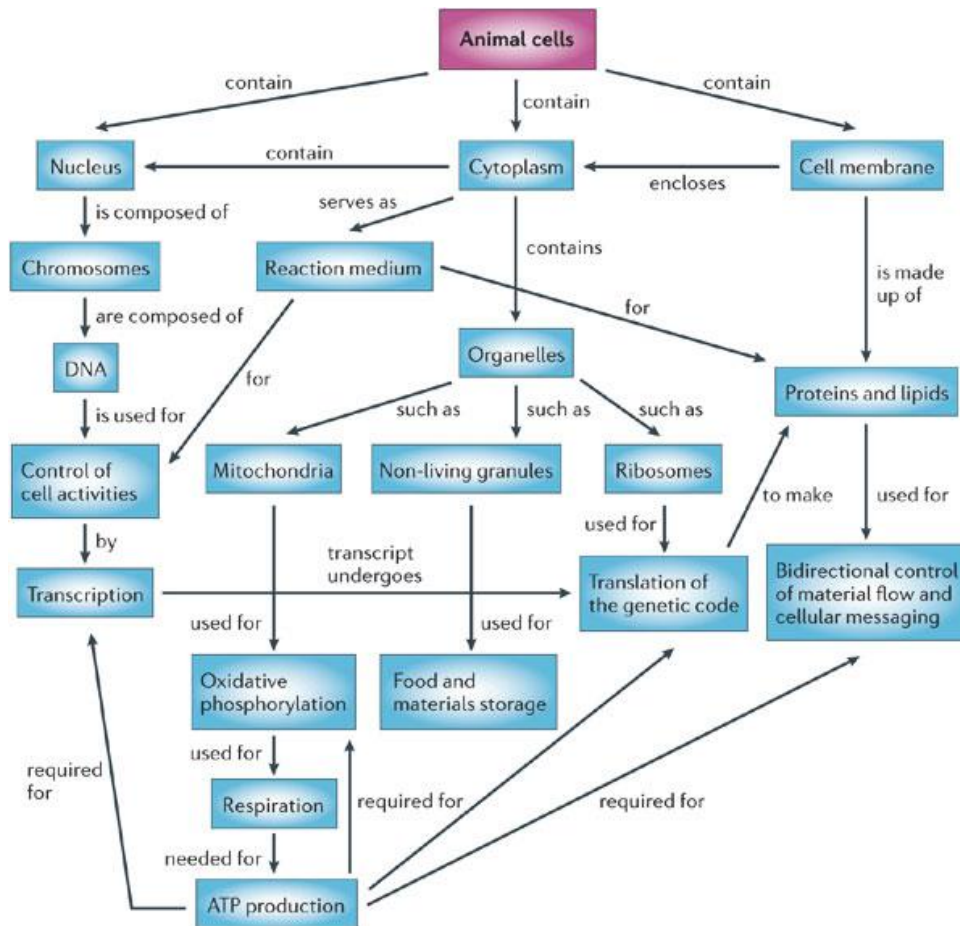


Concept Map

Used to show/explore a complicated topic



Copyright © 2013 Teacher'sBusiness

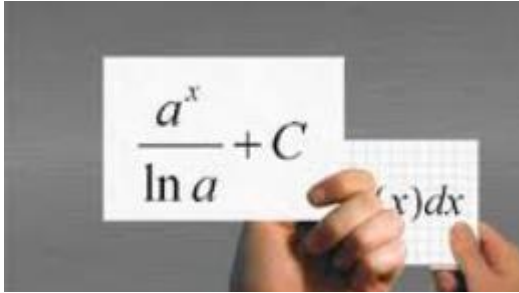


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Nature Reviews | Molecular Cell Biology

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### 5. Flashcards

Highly effective for the small amount of input needed to make them.



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### 6. Testing

Bottom line – very effective

[\[PDF\] study](#)

[psych.wustl.edu/memory/.../BC\\_Roediger%20et%20al%20\(2010\).pdf](http://psych.wustl.edu/memory/.../BC_Roediger%20et%20al%20(2010).pdf) ▼

by HL Roediger III - [Related articles](#)

The above study “reviewed evidence supporting test-enhanced learning in the classroom and as a study strategy (i.e., self-testing) for improving student performance.

Frequent classroom testing has both indirect and direct benefits. The indirect benefits are that students study for more time. Significant testing effects in a middle school setting were revealed such that retention for quizzed material was greater than for non-quizzed material, even up to 9 months later (at the end of the school year).

Greater regularity when tests are frequent, because the specter of a looming test encourages studying. The direct benefit is that testing on material serves as a potent enhancer of retention for this material on future tests, either relative to no activity or even relative to restudying material.

Providing correct answer feedback on tests and insuring that students carefully process this feedback greatly enhances this testing effect. Feedback is especially important when initial test performance is low. (*Seek feedback*).

Multiple tests produce a larger testing effect than does a single test. (*Good practice to re-do tests until perfect*).

In addition, tests requiring production of answers (short answer or essay tests) produce a greater testing effect than do recognition tests (multiple-choice or true/false). The latter tests also have the disadvantage of exposing students to erroneous information, but giving feedback eliminates this problem. Test-enhanced learning is not limited to laboratory materials; it improves performance with educational materials (foreign language vocabulary, science passages) and in actual classroom settings (ranging from middle school classes in social studies, English, and science, to university classes in introductory psychology and biological bases of behaviour). We believe that the application of frequent testing in classrooms can greatly improve academic performance across the curriculum.”