探究研習——研究影響電磁鐵吸力的因素

習作概略：

在這項探究中，你將要找出影響電磁鐵吸力的因素，並設計實驗以演示各個因素的關係。你須與小組成員共同完成此項習作。運用你所掌握的物理學知識和技能來解決問題，並且基於實驗的結果得出結論。

探究活動分為五個階段

1. 尋找和制定探究的問題
2. 制定探究方案
3. 開展探究
4. 組織和分析數據並作出合理的結論
5. 通過撰寫報告、製作海報或其他方式報告探究所得結果

儀器：

每組同學將獲分發以下裝置和材料：

- C 型軟鐵芯
- 軟鐵片
- 繞線
- 乾電池和電池座
- 安培計
- 變阻器
- 開關
- G 型鉗
- 木塊
- 支架
- 滑輪
- 線
- 砝碼
- 連接線
- 發泡膠板

同學亦可提出其他有用的裝置和材料。

討論：

1. 提出影響電磁鐵吸力的因素。在實驗過程中這些因素是否可以改變？識別實驗中哪些因素是自變量、因變量和控制變量。
2. 從書本和網路搜索更多有關電磁鐵吸力的資料。
3. 設計一系列的實驗來測試你的假設。
4. 仔細檢視實驗的可行性和有效性。
5. 進行風險評估以鑒定實驗所需的安全預防措施。

評核:

你的探究將根據以下幾個方面來評估

實驗的設計（將在報告中一併評分）

1. 假設和實驗設計
2. 明確指出自變量、因變量和控制變量

這一部分需在實驗前提交，然後依據老師的意見修訂計劃，並將最後的設計附於實驗報告中。

進行實驗

1. 按部就班地實行計劃
2. 適當地使用儀器
3. 正確的實驗操作技術
4. 團隊合作以及時間管理
5. 具有獨立解決問題的能力

老師或會在實驗過程中提問，以核實同學對探究的理解。

報告內容

1. 理論
2. 實驗設計和步驟
3. 儀器

} 實驗前需提交草稿。每個小組只須提交一份草稿。

4. 數據處理及繪製圖表
5. 根據實驗結果分析和作出結論
6. 記錄參考資料

} 個人習作，附在每組報告的後面。

如果有的話，記錄參考資料

書目/網址: _____ 作者 : _____ 出版社 / 組織機構 : _____ 年份: _____ 閱讀 / 流覽日期 : _____ 學習資料所用的時間: _____
相關資訊:

工作進度表：

2010 年 9 月 13 日	提交實驗設計
2010 年 9 月 21 日	試驗/初步實驗
2010 年 9 月 28 日	實驗
2010 年 10 月 4 日	遞交報告

Investigative Study – To study the factors affecting the strength of an electromagnet

Task outline:

In this investigation, you are going to find the factors affecting the magnetic force produced by an electromagnet and design experiments to show their relationships. You should collaborate with your group-mates to complete the task. You should apply your knowledge and skills in Physics to solve the problems and draw conclusions based on the results obtained.

The investigation is divided into five stages.

1. Searching for and defining questions for investigation
2. Developing an investigation plan
3. Conducting the investigation
4. Organising and analysing data for a justified conclusion
5. Presenting the investigation findings with a written report, posters and other means

Apparatus:

- Soft iron C-core
- Iron plate
- Wrapping wire
- Low voltage power supply
- Ammeter
- Rheostat
- Switch
- G-clamps and wooden blocks
- Stand
- Pulley and strings
- Weights
- Connecting wires
- Polystyrene board

Students are recommended to propose other apparatus and materials that may be useful.

Discussion:

1. Propose the factors that can affect the magnetic force of an electromagnet. Are these factors changeable in the experiment? Identify the independent variables, dependent variables and control variables in your experiment.
2. Carry out a book and web search. Collect more information about electromagnets.
3. Design a series of experiments in which you can check your hypotheses.
4. Carefully examine the feasibility and validity of your experiments.
5. Carry out a risk assessment to identify the safety precaution(s) needed to be taken.

Assessment:

Your work will be assessed in the following areas.

Design of the experiment (marks to be given in the report)

1. Hypothesis and experiment design
2. Dependent, independent and control variables

This part should be submitted before the experiment. Comments will be given and your revised plan should be included in the report.

Implementation

1. Implementation of action plan with understanding
2. Proper use of apparatus
3. Proper experimental skills
4. Group work and time management
5. Ability to deal with problems encountered independently.

Questions may be asked during the experiment to verify understanding.

Report

1. Theory
2. Experiment Design and Procedure
3. Apparatus

} Draft should be submitted before the experiment. Each **group** is required to submit one set only

4. Data presentation and graph plotting
5. Analysis and conclusion drawn according to experimental results
6. Record of reference materials

} **Individual** work. To be attached to the end of group work.

Record format for reference materials

Book / Website : _____ Author : _____ Publisher / Organisation : _____ Year : _____ Reading / Browsing Date : _____ Time spent on studying the information : _____
Relevant information:

Work Schedule:

13 Sep 2010	Submission of Experiment Design
21 Sep 2010	Trial/Preliminary experiment
28 Sep 2010	Experiment
4 Oct 2010	Submission of Report

探究研習——研究影響摩擦力的因素

習作概略：
在這項探究中，你將要找出影響摩擦力的因素，並設計實驗以演示各個因素的關係。你須與小組成員共同完成此項習作。運用你所掌握的物理學知識和技能來解決問題，並且基於實驗的結果得出結論。

探究活動分為五個階段
1. 尋找和制定探究的問題
2. 制定探究方案
3. 開展探究
4. 組織和分析數據並作出合理的結論
5. 通過撰寫報告、製作海報或其他方式報告探究所得結果

儀器：
每組同學將獲分發以下裝置和材料：

- 木塊
- 繪圖板
- 彈簧秤
- 砝碼和螺帽
- 電子秤
- 氣泡水平儀
- 細刷子

同學亦可提出其他有用的裝置和材料。

討論：
1. 提出影響摩擦力的因素。在實驗過程中這些因素是否可以改變？識別實驗中哪些因素是自變量、因變量和控制變量。
2. 從書本和網路搜索更多有關摩擦力的資料。
3. 設計一系列的實驗來測試你的假設。
4. 仔細檢視實驗的可行性和有效性。
5. 進行風險評估以鑒定實驗所需的安全預防措施。

評核:
你的探究將根據以下幾個方面來評估

實驗的設計（將在報告中一併評分）

1. 假設和實驗設計
2. 明確指出自變量、因變量和控制變量

這一部分需在實驗前提交，然後依據老師的意見修訂計劃，並將最後的設計附於實驗報告中。

進行實驗

1. 按部就班地實行計劃
2. 適當地使用儀器
3. 正確的實驗操作技術
4. 團隊合作以及時間管理
5. 具有獨立解決問題的能力

老師或會在實驗過程中提問，以核實同學對探究的理解。

報告內容

1. 理論
2. 實驗設計和步驟
3. 儀器

} 實驗前需提交草稿。每個小組只須提交一份草稿。

4. 數據處理及繪製圖表
5. 根據實驗結果分析和作出結論
6. 記錄參考資料

} 個人習作，附在每組報告的後面。

如果有的話，記錄參考資料

書目/網址: _____ 作者：_____ 出版社 / 組織機構：_____ 年份: _____ 閱讀 / 流覽日期：_____ 學習資料所用的時間: _____
相關資訊:

工作進度表：

2010 年 9 月 13 日	提交實驗設計
2010 年 9 月 21 日	試驗/初步實驗
2010 年 9 月 28 日	實驗
2010 年 10 月 4 日	遞交報告

Investigative Study - To study the factors affecting friction

Task outline:

In this investigation, you are going to find the factors affecting friction and design experiments to show their relationships. You should collaborate with your group-mates to complete the task. You should apply your knowledge and skills in Physics to solve the problems and draw conclusions based on the results obtained.

The investigation is divided into five stages.

1. Searching for and defining questions for investigation
2. Developing an investigation plan
3. Conducting the investigation
4. Organising and analysing data for a justified conclusion
5. Presenting the investigation findings with a written report, posters and other means

Apparatus:

The following apparatus and materials will be provided:

- Wooden block
- Drawing board
- Spring balance
- Weights and nuts
- Electronic balance
- Spirit level
- Fine brush

Students are recommended to propose other apparatus and materials that may be useful.

Discussion:

1. Propose the factors that can affect friction. Are these factors changeable in the experiment ? Identify the independent variables, dependent variables and control variables in your experiment.
2. Carry out a book and web search. Collect more information about friction.
3. Design a series of experiments in which you can check your hypotheses.
4. Carefully examine the feasibility and validity of your experiments.
5. Carry out a risk assessment to identify the safety precaution(s) needed to be taken.

Assessment:

Your work will be accessed in the following areas.

Design of the experiment (marks to be given in the report)

1. Hypothesis and experiment design
2. Dependent, independent and control variables

This part should be submitted before the experiment. Comments will be given and your revised plan should be included in the report.

Implementation

1. Implementation of action plan with understanding
2. Proper use of apparatus
3. Proper experimental skills
4. Group work and time management
5. Ability to deal with problems encountered independently.

Questions may be asked during the experiment to verify understanding.

Report

1. Theory
2. Experiment Design and Procedure
3. Apparatus

} Draft should be submitted before the experiment. Each **group** is required to submit one set only

4. Data presentation and graph plotting
5. Analysis and conclusion drawn according to experimental results
6. Record of reference materials

} **Individual** work. To be attached to the end of group work.

Record format for reference materials

Book / Website : _____ Author : _____ Publisher / Organisation : _____ Year : _____ Reading / Browsing Date : _____ Time spent on studying the information : _____
Relevant information:

Work Schedule:

13 Sep 2010	Submission of Experiment Design
21 Sep 2010	Trial/Preliminary experiment
28 Sep 2010	Experiment
4 Oct 2010	Submission of Report

探究研習——研究影響拋體射程的因素

習作概略：
首先要掌握拋體運動的知識。
在這項探究中，你將要設計製作一個氣墊桌或其他適合研究拋體運動的裝置。你應設計可展現一個物體拋射的射程與 v^2 和 $\sin(2\theta)$ 成正比的實驗。你須與小組成員共同完成這個習作。運用你所掌握的物理知識和技能來解決問題，並且基於實驗的結果得出結論。

探究活動分為五個階段
1. 尋找和制定探究的問題
2. 制定探究方案
3. 開展探究
4. 組織和分析數據並作出合理的結論
5. 通過撰寫報告、製作海報或其他方式報告探究所得結果

儀器：
每組同學將獲分發以下裝置和材料：
- 吹風機
- 在氣墊桌上運動的圓盤
- 數碼攝錄機
- 米尺

同學亦可提出其他有用的裝置和材料。

討論：
1. 提出影響拋體射程的因素。在實驗過程中這些因素是否可以改變？識別實驗中哪些因素是自變量、因變量和控制變量。
2. 從書本和網路搜索更多有關拋體運動的資料。
3. 設計一系列的實驗來測試你的假設。
4. 仔細檢視實驗的可行性和有效性。
5. 進行風險評估以鑒定實驗所需的安全預防措施。

評核:
你的探究將根據以下幾個方面來評估

實驗的設計（將在報告中一併評分）

1. 設計製作一個用於研究拋體運動的氣墊桌或其他裝置。
2. 減少圓盤的加速度，使慢動作能夠被演示。
3. 為拋體設計製作一個發射器。

這一部分需在實驗前提交，然後依據老師的意見修訂計劃，並將最後的設計附於實驗報告中。

進行實驗

1. 按部就班地實行計劃
2. 適當地使用儀器
3. 正確的實驗操作技巧
4. 團隊合作及時間管理
5. 具有獨立解決問題的能力

老師或會在實驗過程中提問，以核實同學對探究的理解。

報告內容

理論
實驗設計和步驟
儀器
} 實驗前需提交草稿。每個小組只須提交一份草稿。

數據處理及繪製圖表
根據實驗結果分析和作出結論
記錄參考資料
} 個人習作，附在每組報告的後面。

如果有的話，記錄參考資料

書本 / 網站：_____ 作者：_____ 出版社/ 組織機構：_____ 年份：____ 閱讀 / 流覽日期：_____ 學習資料所用的時間：_____
相關資訊：

工作進度表：

2010 年 11 月 06 日	提交實驗設計
2010 年 11 月 13 日	試驗/初步實驗
2010 年 11 月 20 日	實驗
2010 年 11 月 27 日	遞交報告

Investigative Study - To study the factors affecting the range of a projectile

Task outline:

Prior knowledge of projectile motion is required.

In this investigation, you are going to make an air table or other apparatus suitable for studying projectile motion and design experiments to show that the range of projection of an object is proportional to v^2 and $\sin(2\theta)$ of the projection . You should collaborate with your group-mates to complete the task. You should apply your knowledge and skills in Physics to solve the problems and draw conclusions based on the results obtained.

The investigation is divided into five stages.

1. Searching for and defining questions for investigation
2. Developing an investigation plan
3. Conducting the investigation
4. Organising and analysing data for a justified conclusion
5. Presenting the investigation findings with a written report, posters and other means

Apparatus:

The following apparatus and materials will be provided:

- Air blower
- Disc moving on the air table
- Digital video camera
- Metre rule

Students are recommended to propose other apparatus and materials that may be useful.

Discussion:

1. Propose the factors that can affect the range of a projectile. Are these factors changeable in the experiment ? Identify the independent variables, dependent variables and control variables in your experiment.
2. Carry out a book and web search. Collect more information about projectile motion.
3. Design a series of experiments in which you can check your hypotheses.
4. Carefully examine the feasibility and validity of your experiments.
5. Carry out a risk assessment to identify the safety precaution(s) needed to be taken.

Assessment:

Your work will be assessed in the following areas.

Design of the experiment (marks to be given in the report)

1. Make an air table or other apparatus for studying projectile motion
2. Decrease the acceleration of the disc so that slow motion can be demonstrated
3. Make the emitter for the projectile

This part should be submitted before the experiment. Comments will be given and your revised plan should be included in the report.

Implementation

1. Implementation of action plan with understanding
2. Proper use of apparatus
3. Proper experimental skills
4. Group work and time management
5. Ability to deal with problems encountered independently.

Questions may be asked during the experiment to verify understanding.

Report

1. Theory
2. Experiment Design and Procedure
3. Apparatus

} Draft should be submitted before the experiment. Each **group** is required to submit one set only

4. Data presentation and graph plotting
5. Analysis and conclusion drawn according to experimental results
6. Record of reference materials

} **Individual** work. To be attached to the end of group work.

Record format for reference materials if any

Book / Website : _____
Author : _____ Publisher / Organisation : _____ Year : _____
Reading / Browsing Date : _____ Time spent on studying the information : _____
Relevant information:

Work Schedule:

6 Nov 2010	Submission of Experiment Design
13 Nov 2010	Trial/Preliminary experiment
20 Nov 2010	Experiment
27 Nov 2010	Submission of Report

探究研習——研究影響熱水冷卻率的因素

習作概略：
在這項探究中，你將要找出影響熱水溫度下降率的因素， 並設計實驗以演示各個因素的關係。你須與小組成員共同完成這個習作。運用你所掌握的物理知識和技能來解決問題，並且基於實驗的結果得出結論。

探究活動分為五個階段
1. 尋找和制定探究的問題
2. 制定探究方案
3. 開展探究
4. 組織和分析數據並作出合理的結論
5. 通過撰寫報告、製作海報或其他方式報告探究所得結果

儀器：
每組同學將獲分發以下裝置和材料：
- 數據收集儀
- 温度感應器
- 真空瓶
- 攪伴棒
- 温度計
- 水松板
- 電水煲

同學亦可提出其他有用的裝置和材料。

討論：
1. 提出影響熱水冷卻率的因素。在實驗過程中這些因素是否可以改變？識別實驗中哪些因素是自變量、因變量和控制變量。
2. 從書本和網路搜索更多有關冷卻定律的資料。
3. 寫出功率損失跟熱水溫度下降 率的關係等式。
4. 設計一系列的實驗來測試你在 (3) 所提出的等式。
5. 進行風險評估以鑒定實驗所需的安全預防措施。

評核:
你的探究將根據以下幾個方面來評估

實驗的設計（將在報告中一併評分）

設計一個實驗以找出這些因素如何影響溫度下降　　率。
這一部分需在實驗前提交，然後依據老師的意見修訂計劃，並將最後的設計附於實驗報告中。

進行實驗

1. 按部就班地實行計劃
2. 適當地使用儀器
3. 正確的實驗操作技巧
4. 團隊合作及時間管理
5. 具有獨立解決問題的能力

老師或會在實驗過程中提問，以核實同學對探究的理解。

報告內容

理論
實驗設計和步驟
儀器
} 實驗前需提交草稿。每個小組只須提交一份草稿。

數據處理及繪製圖表
根據實驗結果分析和作出結論
記錄參考資料
} 個人習作，附在每組報告的後面。

如果有的話，記錄參考資料

書本 / 網站：_____ 作者：_____ 出版社/ 組織機構：_____ 年份：____ 閱讀 / 流覽日期：_____ 學習資料所用的時間：_____
相關資訊：

工作進度表：

2010 年 11 月 06 日	提交實驗設計
2010 年 11 月 13 日	試驗/初步實驗
2010 年 11 月 20 日	實驗
2010 年 11 月 27 日	遞交報告

Investigative Study –To study the factors affecting the rate of cooling of hot water

Task outline:

In this investigation, you are going to find the factors affecting the rate of temperature drop of hot water and design experiments to show their relationships. You should collaborate with your group-mates to complete the task. You should apply your knowledge and skills in Physics to solve the problems and draw conclusions based on the results obtained.

The investigation is divided into five stages.

1. Searching for and defining questions for investigation
2. Developing an investigation plan
3. Conducting the investigation
4. Organising and analysing data for a justified conclusion
5. Presenting the investigation findings with a written report, posters and other means

Apparatus:

The following apparatus and materials will be provided:

- Data logger
- Temperature sensor
- Vacuum flask
- Stirrer
- Thermometer
- Cork plate
- Electric kettle

Students are recommended to propose other apparatus and materials that may be useful.

Discussion:

1. Propose the factors affecting the rate of cooling of hot water. Identify the independent variables, dependent variables and control variables in your experiment.
2. Carry out a book and web search about the law of cooling.
3. Write down an equation relating the power loss and the rate of temperature drop of the hot water.
4. Design a series of experiments to verify the equation proposed in (3).
5. Carry out a risk assessment to identify the safety precaution(s) needed to be taken.

Assessment:

Your work will be accessed in the following areas.

Design of the experiment (marks to be given in the report)

Design an experiment to find out how the factor(s) affect the rate of temperature drop of hot water.
This part should be submitted before the experiment. Comments will be given and your revised plan should be included in the report.

Implementation

1. Implementation of action plan with understanding
2. Proper use of apparatus
3. Proper experimental skills
4. Group work and time management
5. Ability to deal with problems encountered independently.

Questions may be asked during the experiment to verify understanding.

Report

1. Theory
2. Experiment Design and Procedure
3. Apparatus

} Draft should be submitted before the experiment. Each **group** is required to submit one set only

4. Data presentation and graph plotting
5. Analysis and conclusion drawn according to experimental results
6. Record of reference materials

} **Individual** work. To be attached to the end of group work.

Record format for reference materials if any

Book / Website : _____ Author : _____ Publisher / Organisation : _____ Year : _____ Reading / Browsing Date : _____ Time spent on studying the information : _____
Relevant information:

Work Schedule:

6 Nov 2010	Submission of Experiment Design
13 Nov 2010	Trial/Preliminary experiment
20 Nov 2010	Experiment
27 Nov 2010	Submission of Report

探究研習——研究影響終端速度的因素

習作概略：

在這項探究中，你將要找出影響在水中落球終端速度的因素，並設計實驗以演示各個因素的關係。你須與小組成員共同完成此項習作。運用你所掌握的物理學知識和技能來解決問題，並且基於實驗的結果得出結論。

探究活動分為五個階段

1. 尋找和制定探究的問題
2. 制定探究方案
3. 開展探究
4. 組織和分析數據並作出合理的結論
5. 通過撰寫報告、製作海報或其他方式報告探究所得結果

儀器：

每組同學將獲分發以下裝置和材料：

- 直徑為 5 cm，2 m 長的塑膠空管
- 直徑為 1.5 cm 的空心球
- 小金屬球
- 秒錶
- 米尺

同學亦可提出其他有用的裝置和材料。

討論：

1. 提出影響終端速度的因素。在實驗過程中這些因素是否可以改變？識別實驗中哪些因素是自變量、因變量和控制變量。
2. 從書本和網路搜索更多有關終端速度的資料。
3. 設計一系列的實驗來測試你的假設。
4. 仔細檢視實驗的可行性和有效性。
5. 進行風險評估以鑒定實驗所需的安全預防措施。

評核:

你的探究將根據以下幾個方面來評估

實驗的設計（將在報告中一併評分）

1. 假設和實驗設計
2. 明確指出自變量、因變量和控制變量

這一部分需在實驗前提交，然後依據老師的意見修訂計劃，並將最後的設計附於實驗報告中。

進行實驗

1. 按部就班地實行計劃
2. 適當地使用儀器
3. 正確的實驗操作技術
4. 團隊合作以及時間管理
5. 具有獨立解決問題的能力

老師或會在實驗過程中提問，以核實同學對探究的理解。

報告內容

1. 理論
2. 實驗設計和步驟
3. 儀器

} 實驗前需提交草稿。每個小組只須提交一份草稿。

4. 數據處理及繪製圖表
5. 根據實驗結果分析和作出結論
6. 記錄參考資料

} 個人習作，附在每組報告的後面。

如果有的話，記錄參考資料

書目/網址: _____ 作者：_____ 出版社 / 組織機構：_____ 年份: _____ 閱讀 / 流覽日期：_____ 學習資料所用的時間: _____
相關資訊:

工作進度表：

2010 年 9 月 13 日	提交實驗設計
2010 年 9 月 21 日	試驗/初步實驗
2010 年 9 月 28 日	實驗
2010 年 10 月 4 日	遞交報告

Investigative Study - To study the factors affecting terminal velocity

Task outline:

In this investigation, you are required to *find the factors affecting the terminal velocity of a falling sphere in water* and design experiments to *show their relationships*. You should collaborate with your group-mates to complete the task. You should apply your knowledge and skills in Physics to solve the problems and draw conclusions based on the results obtained.

The investigation is divided into five stages.

1. Searching for and defining questions for investigation
2. Developing an investigation plan
3. Conducting the investigation
4. Organising and analysing data for a justified conclusion
5. Presenting the investigation findings with a written report, posters and other means

Apparatus:

The following apparatus and materials will be provided:

- A plastic hollow tube of 5 cm diameter and 2 m long
- Hollow sphere(s) of 1.5 cm diameter
- Small metal spheres
- Stop watch
- Metre rule

Students are recommended to propose other apparatus and materials that may be useful.

Discussion:

1. Propose the factors that can affect terminal velocity. Are these factors changeable in the experiment? Identify the independent variables, dependent variables and control variables in your experiment.
2. Carry out a book and web search. Collect more information about terminal velocity.
3. Design a series of experiments in which you can check your hypotheses.
4. Carefully examine the feasibility and validity of your experiments.
5. Carry out a risk assessment to identify the safety precaution(s) needed to be taken.

Assessment:

Your work will be assessed in the following areas.

Design of the experiment (marks to be given in the report)

1. Hypothesis and experiment design
2. Dependent, independent and control variables

This part should be submitted before the experiment. Comments will be given and your revised plan should be included in the report.

Implementation

1. Implementation of action plan with understanding
2. Proper use of apparatus
3. Proper experimental skills
4. Group work and time management
5. Ability to deal with problems encountered independently.

Questions may be asked during the experiment to verify understanding.

Report

1. Theory
2. Experiment Design and Procedure
3. Apparatus

} Draft should be submitted before the experiment. Each **group** is required to submit one set only

4. Data presentation and graph plotting
5. Analysis and conclusion drawn according to experimental results
6. Record of reference materials

} **Individual** work. To be attached to the end of group work.

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Relevant information:

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13 Sep 2010	Submission of Experiment Design
21 Sep 2010	Trial/Preliminary experiment
28 Sep 2010	Experiment
4 Oct 2010	Submission of Report