Common ASSESSMENT TASK 1 NOTIFICATION – YEAR 12

Faculty: TAS	**Year / Class: 12EGS**
Course: Year 12 Engineering Studies	**Class Teacher: Mr. Dong**
Task Title: Personal and Public Transport **Weighting: 25% / Total: 440 Marks**	**Due Date: 10/03/2017**

TASK INSTRUCTIONS & REQUIREMENTS:

Task Description:

Complete an engineering report and six class assignments.

OUTCOMES ASSESSED:

H1.1	describes the scope of engineering and critically analyses current innovations
H5.2	selects and uses appropriate management and planning skills related to engineering
H6.1	demonstrates skills in research and problem-solving related to engineering
H6.2	demonstrates skills in analysis, synthesis and experimentation related to engineering

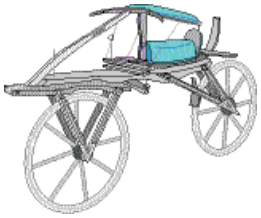
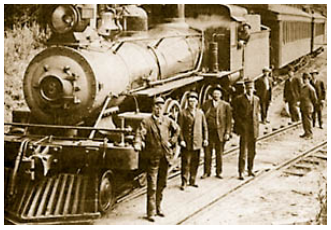
Marking Criteria		
A **Outstanding**	Extensive applied knowledge & understanding of content - Achieved a very high level of competence	100 - 86
B **High**	Thorough knowledge & understanding of content - Achieved a high level of competence	85 - 76
C **Sound**	Sound knowledge & understanding of content - Achieved adequate level of competence	75 - 56
D **Basic**	Basic knowledge & understanding of content - Achieved a limited level of competence	55 - 41
E **Limited**	Elementary knowledge & understanding of some content - Achieved very limited level of competence	40 - 0
Teacher Feedback:		

Engineering Studies

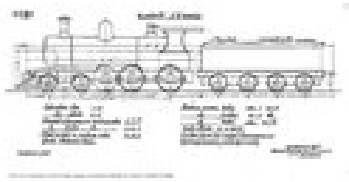
(HSC Course)








Personal and Public Transport

The Engineering Report 2

&

Class Assignments No 1 - 6

INSTRUCTIONS:

1. All work is to be submitted on A4 paper stapled together at the top LHS of the page and placed in a plastic sleeve. *(Work will not be accepted in plastic display folders)*
2. Headers and footers:
    a. Place the subject name at the top LHS of each page
    b. Place the module name at the top RHS of each page
    c. Place your name at the bottom LHS of each page
    d. Place the page numbers at the bottom RHS of each page
3. Steps:
    a. Write the question first – in red preferably (include any question drawing i.e. scan or paste them onto your page)
    b. Then present your analysis of the problem, include Free Body Diagrams.
    c. Next is the working-out with the answer made bold or underlined.
    (No marks will be awarded if there is no working-out shown!)
4. **Start a new page with every assignment. Correct question numbering is important.**

Ingleburn High School
Faculty of Technology and Applied Studies

Engineering Studies - ASSESSMENT TASK
STAGE 6
Cover Sheet

Task No: 2 Date due: ___/___/___

Topic: PERSONAL AND PUBLIC TRANSPORT

Marks: _____/ 430

HSC course weighting: (Stage 6 Only)

Engineering Reports: *25% ÷ 5 Reports*

Class Assignments: *25% ÷ ? Assignments*

Task: *(Full details on page 3)*

- Submit all Class Assignments completes for this module.
- Submit the Engineering Report for this module.

Method of Assessment:
Homework research task and class work

TEACHER EXPECTATIONS
We expect you to do your best work at all times. Use clear written communication including correct spelling and appropriate language structure. Students who do not meet the following basic outcomes will be required to redo this work as a learning experience and your original marks given will stand.

Assessment Criteria:
You will be assessed on your ability to:

H1.1 - SCOPE OF THE PROFESSION: describes the scope of engineering and critically analyses current innovations
H1.2 - MATERIALS SCIENCE: differentiates between properties of materials and justifies the selection of materials, components and processes in engineering
H2.1 - MATERIALS ENGINEERING: determines suitable properties, uses and applications of materials in engineering
H2.2 - IMPACT OF ENGINEERING: analyses and synthesises engineering applications in specific fields and reports on the importance of these to society
H3.1 - MECHANICS: demonstrates proficiency in the use of mathematical, scientific and graphical methods to analyse and solve problems of engineering practice
H3.2 - ENGINEERS REPORT: uses appropriate written, oral and presentation skills in the preparation of detailed engineering reports
H3.3 - GRAPHICAL COMMUNICATION SKILLS: develops and uses specialised techniques in the application of graphics as a communication tool
H4.1 - TECHNOLOGICAL INOVATIONS: investigates the extent of technological change in engineering
H4.2 - TECHNOLOGICAL HISTORY: applies knowledge of history and technological change to engineering- based problems
H4.3 - IMPACT OF TECHNOLOGY CHANGE: appreciates social, environmental and cultural implications of technological change in engineering and applies them to the analysis of specific problems
H5.1 - TEAM WORK: works individually and in teams to solve specific engineering problems and in the preparation of engineering reports
H5.2 - TIME MANAGEMENT: selects and uses appropriate management and planning skills related to engineering
H6.1 - PROBLEM SOLVING SKILLS: demonstrates skills in research and problem-solving related to engineering
H6.2 - ENGINEERING METHODOLOGY: demonstrates skills in analysis, synthesis and experimentation related to engineering

Marking Criteria for Assessment Task:

	No	Mk	Total
A. The Engineering Report Content			
1. **Bicycle frame analysis –** Chronological timeline of the bicycle development	1	10	10
2. Bicycle frame analysis	1	50	50 *(60)*
Report Presentation			
1. Use of formal language (No I, we etc) as well as grammar and spelling			2
2. Correct numbered headings (1 heading 1, 1.1 heading 2, 1.1.1 heading 3)			2
3. Diagrams, Charts and Tables – Labelled and captioned correctly (Clear no fuzzy images)			2
4. General formatting including – New pages for new sections, appropriate use of spacing, location of graphics			4 *(10)*
Total for Report			**70**

B. Class Assignments

Assignment 1 - Historical Developments in Transport Systems	60
Assignment 2 – Research, Team Work - **Engineering, Electricity and Electronics in Transport Systems**	50
Assignment 3 - Power Generation and Distribution	50
Assignment 4 – Engineering Mechanics – Friction, Work, Energy and Power	60
Assignment 5 – Materials Science – Heat Treatment, forming, Non-Ferrous Alloys, Ceramics, Glass, Polymers	140
Assignment 6 – Graphical Communication – Vibration Analysis Engineering Report	10
Total for Assignments	**360**

TOTAL FOR MODULE	**440**

Marking guidelines (Indicators)

Code	School Report Levels	Grade	% Mark	Mark	2005 BOS Grade - General Performance Descriptors:
1	Highly Developed	A	100 - 86	10 - 9	Extensive applied knowledge & understanding of content - Achieved a very high level of competence
2	Competent	B	85 - 76	8 - 7	Thorough knowledge & understanding of content - Achieved a high level of competence
3	Developing	C	75 - 56	6 - 5	Sound knowledge & understanding of content - Achieved adequate level of competence
4	Experiencing Difficulty	D	55 - 41	4	Basic knowledge & understanding of content - Achieved a limited level of competence
		E	40 - 0	3 - 0	Elementary knowledge & understanding of some content - Achieved very limited level of competence

Feedback to students:

The teacher will provide written or verbal feedback. Comments will inform students about such things as:

- Verbal one to one review
- Class review teacher/class
- Reference to past work samples

✂----------✂----------✂----------✂----------✂----------✂----------✂----------✂----------✂----------✂

Ingleburn High School - Faculty of Technology and Applied Studies

Engineering Studies – Assessment Task
SUBMISSION RECEIPT

Task No: 2 Date due: ___/___/___

Topic: PERSONAL AND PUBLIC TRANSPORT

Student name: _____ _____ Date submitted: ____/____/____

Class: _____ Teachers signature: _____

PERSONAL AND PUBLIC TRANSPORT

The Engineering Report Date due: ___/___/___

Investigation and Analysis Report of on the Bicycle **Marks 60**

Currently the bicycle industry has many choices of materials from which to manufacture their frames.

1. Using a **chronological time line** outline the key developments in bicycle frame technology *(10)*
2. Make a **judgement** on the best material for a small recumbent tricycle company, currently *(50)* making 1000 cycles a year. The materials you can choose from are:
    a. Reynolds 853
    b. Reynolds X100
    c. Titanium alloy
    d. 7005 Aluminium alloy
    e. Carbon fibre
    f. 4130 chromium molybdenum

    Your report should consider the strengths of the materials, the fatigue resistance, its resistance to bending and the ease with which it can be joined. *(Hint: Use a table to compile this information)*

    - Remember this is a small company, and cost is important, but so is weight.
    - Recumbent tricycles can be heavy and expensive, so the company wants to keep weight and cost down.
    - Also be aware that recumbent trikes have greater bending on their frames, as they are not triangulated as much as upright bike frames.

The Report must contain the following:
A Title page
Use the report format outlined in Chapter 1, Copeland Vol 2 pages 63-65. Shown below

Engineering Report

In Volume I of this book the Engineering Reports were limited to a fairly simple approach using a comparison of engineered items. For the HSC course, however, we need to lift the reports to a higher level, using a more formal structure.

Below is a list of headings that your engineering report could be based on.

Title page: This should list the title of the report and your or your group's name. A title page should be visually appealing. Make sure it presents your work well without overdoing it.

Synopsis: This is a summary of the content and aim of the report. The synopsis should provide enough information to give an overview, or outline, of the primary points of the report.

Introduction: The introduction sets the scene for the report by giving the subject, purpose and parameters of the report. You may also include a background for the report such as some history of the topic.

Methodology: This is the description of the method or process used to carry out the work required for the report. If you have had to conduct experiments then this section is where you outline the equipment and procedure used.

Results: It is here that the outcome of the investigation or experiment is recorded. It should include figures, graphs and perhaps tables that have allowed you to gain the results. Do not load up the results sections with a lot of calculations, pictures or drawings. It is better to place these in an appendix at the end and then refer to the appendix.

Conclusion: This is the resolution of the report, the judgement made from the evidence in the results section. It may be the choice of which alloy steel is best for reinforcing concrete, or which metal tube is best for bicycle manufacture.
Recommendation: After the report is concluded a recommendation may be made as to the final choice, such as, "The most appropriate tubing for the bicycle is an air hardening steel, such as Reynolds 853."

Acknowledgements: If somebody has helped you in any way in the preparation of your report, their names should be included here. This section is a good place to add names of people who have helped you obtain information from companies you contacted. Give these people the credit they deserve. It is unethical to use other people's work without due acknowledgement.

References: If you gain any information from books or journals then they should be included here. At university this will become an exceedingly important task, as to claim work that is not yours, is academic misconduct and may result in expulsion. Use a similar style for referencing to the method below, which is used by many tertiary institutions,

Author Name/s. (Year), Title of Book, Location, Publisher. For example,

Copeland, Paul L. (2000) Engineering Studies — The Definitive Guide. Sydney, Anno Domini 2000

Academic fraud or plagiarism is when you claim as yours work that is actually somebody else's. If you use somebody's work exactly as written you must quote them, while if you use their work as a reference then you must list it as a reference. With the Internet and CD encyclopaedias it is often appealing to just cut and paste work into your document. This is fraudulent and should not be done. Make sure the report is your own work.

Appendix: Finally, at the very end, include any appendices, with calculations, drawings etc. This means that the readers do not have to read this information but it is there if required.

Presentation Or . . "Does this look OK?"

Many people will give very different views on how to present your report These are some tips that could be useful.

When you write headings do not use all capitals. They are hard to read. For example, try to read "LAUGH" from a distance, then try to read "laugh" with the font enlarged to a similar size.
Underlining is out of date. Underlining affects the readability of words as it cuts through descenders (the bottom of letters that run under the line) and it tends to run all letters in the word together. A better option is to use italics or bold letters.

Fancy fonts or typefaces may look good on a party invitation but they are often harder to read. They also tend to make your report look too informal.

Don't write the main body of your report in a font any larger than 12 point. Larger fonts look as if you are trying to pad out work that is insufficient.

When choosing a font for the body of the report choose a serif font. A serif font is one with little tails on the end of the letters like the Times New Roman font used in this book. Sans serif fonts like Anal are not as easy to read in large blocks of writing. They are, however, good for headings.

When you write make sure you use a formal writing style. That means not using colloquialisms and limiting your use of contractions ('do not' instead of 'don't'). Do not write in the first person, i.e. do not write "I have conducted an experiment. . ."; rather say "An experiment was conducted...". Ensure that all sentences are in the same tense.

In most word processors, many words that are spelt correctly will be listed as incorrect by the spell checker because spell checkers are automatically set to American spelling. Try to set the computer to British spelling (not Australian as the Australian spell checker is often, incorrectly, the same as American), and watch for words like 'aluminum' and 'airplane' in American texts. In Australia we say 'aluminium' and 'aeroplane'.

Make sure you use the correct punctuation for the sentence, for example, a semi colon (;) is used when a sentence changes subject, not at the end of a sentence prior to a list.

References - it is necessary to show where you found each piece of information. For example at the end of this assignment you are required to name the web site, textbook, etc) publisher, author, date of publication and page number) Relate this information back to each part of the text as 1. 2.3. 4. etc.

Notes

- *Don't copy the work word for word you must use your own words.*
- *Assignments not handed in on time will be dealt with according to the school assessment policy statement given to you.*

PERSONAL AND PUBLIC TRANSPORT

Assignment No.1 Date due: ___/___/___

Marks 60

Historical Developments in Transport Systems

Attempt the following questions from Copeland Vol. 2, page 135 *(40)*

1.What was the first real bicycle?
2.Why did early bicycles use front wheel drive?
3.Why was the Old Ordinary get developed? What were its advantages and disadvantages?
4.Why was the Safety Bicycle such an important development?
5.What important development for transport devices occurred in 1888?
6.What is a mountain bike?
7.Why is the Moulton such an efficient design? Why is it not more common?
8.What are the advantages and disadvantages of recumbent bicycles?
9.What makes recumbent tricycles so good for touring?
10.The Ford Model T is generally considered the most important car ever. Why is this so?
11.Why was the Mini such a revolutionary car design?
12.Why was Stephenson's *Rocket* important?
13 What were the advantages of the Garret locomotive'?
14.What were Shay locomotives used for?
15.Why do diesel/electric trains use electricity to provide traction instead of a gearbox, like cars and trucks?
16.Why are newer alloy steels still desirable in bicycles?
17.Why are aluminium alloys used so extensively in bicycles?
18 What makes carbon 3bre composite frames desirable for racing bikes'?
19.List two environmental impacts of the car?
20.Imagine that the car is banned tomorrow in Sydney. What would the effects be? What would the transport solution be?

Effects of Engineering Innovation in Transport on People's lives

1.1 Read the Cycles, Cars and Trains points on pages 86-87 from Copeland Vol. 2 which is shown below. Add a heading Planes and make a summary of the effects of planes on people's lives. *(10)*

Effects of Engineering Innovation in Transport on People's Lives

It is important to the study of historical topics that students learn how to make notes. Following is a note summary of effects of innovation on people's lives.

Cycles

- The pedal-powered velocipede, 1839, greatly improved the usability of the bicycle.
- Old Ordinary (Penny Farthing) — faster transport than the velocipede but dangerous to ride
- Rover Safety Cycle, 1885 — safer transport with similar speeds
- 1888 — Dunlop's pneumatic tyres
- Early 1900s — mass production of the bicycle
- Freewheeling hubs made cycling far safer for riders
- Internal hub gearing — improved bike as a form of transport
- High strength steel alloys, such as Reynolds 531 — bikes made lighter.

- Recumbent bikes — better comfort but outlawed from racing — stalled their development
- Lightweight aluminium alloys & reliable derailleur gears — improved traditional design of Safety Cycle.
- After WWII — cycle usage declined as cheap cars available — subsequent pollution not much considered.
- Suez oil crisis, *1950s* — forced many people back to bikes — cycle development took off again
- Moulton bike sparked cycling craze in UK — suited image of the swinging sixties.
- BMX (Bicycle Motor Cross) — small wheels — off road racing — popular with children
- 1980s — rise of the mountain bike — grew into the most popular bike — many specialised components developed.
- Recumbent bikes and trikes grew in popularity to create a niche market — good for long-distance touring — easier on the body
- 1990s — more exotic materials — more weight savings — improved performance

Cars

- The car first resisted by society — no advantage over the horse and cart.
- Early cars — slow, noisy, expensive.
- Model T Ford, 1908, production line method of manufacture — cars cheap and available to many — In UK the Austin 7 had a similar effect, from 1922
- Development of four-wheel brakes, Austins, — car safer
- Cheap cars after WWII get people on the road — vast countries like the USA and Australia — car an important link to rural areas.
- Mini, 1959 — large impact on car design — plenty of room in a cheap car — suited swinging sixties image.
- Improvements in handling and braking — still occurring — innovative suspension and disc brakes improved dynamic safety.
- Late 1960s and early 1970s safety became a big issue — makers advertise car safety, e.g. Volvo rested all its marketing on this point.
- By the 1970s the car became a status symbol so big cars seen as better but energy crisis saw boom in small cars.
- 1980s and 1990s — introduction of computer systems to cars — improved reliability and safety
- Pollution concerns — $_{21}$st century will see less polluting power systems replace internal combustion engine
- Finally, the car has many negative impacts — pollution, injury and death — often seen as necessary evil

Trains:

- Steam train — $_{19}$th century alternative to the horse and cart for transport.
- Railways systems developed world-wide, $_{19}$th century — ability for people to travel across country for first time- meant a boom for many small towns.
- Electric trains, $_{20}$th century, in urban environments, reduced pollution compared to steam trains.
- Train, important tool in W\VI and WWI — supplies, movement of troops.
- After WWII, diesel train started to appear — by 1960s starting to replace steam — less pollution, greater reliability, quicker times
- More electric rail networks — further improvement of air quality.
- High-speed trains greatly cut transport times, e.g. English Channel Tunnel train faster from London to Paris than plane.
- Today, some see well-designed electric trains and light rail systems as answer to traffic congestion.

Environmental effects of transport systems on society

1.2 List 5 positive and 5 negative environmental effects that are a direct result of Transport Systems in use in the Sydney CBD at the moment. (use a table to answer this question) *(10)*

PERSONAL AND PUBLIC TRANSPORT

Assignment No.2 Date due: ___/___/___

Research – Team Work (max. of 2 –3 people in a team)

Engineering, Electricity and Electronics in Transport Systems **Marks 50**

Many forms of Transport are controlled by and interact with various control systems or control mechanisms. These control systems may be Mechanical, Electrical, Electronic, Chemical or Human.

2.1 Typical control systems are made up of Sensors, Actuators and a Processing System. **Describe** a sensor and two actuators that can be part of a control system at automatic train crossing gates. (the answer for this can be found at HSC online) *(10)*

2.2 A car's central locking system is activated by a Solenoid. With the aid of a sketch, **describe** the operation of a Solenoid. *(10)*

2.3 What is a microprocessor, and where is it used in cars? A simple diagram would help in the description. *(10)*

2.4 What is a digital signal? **Compare** this type of signal with that of an analogue signal. *(10)*

2.5 What type of Sensor would you use to measure the following quantities: *(10)*

a. Change in temperature
b. Rotation
c. Motion
d. Flow
e. Pressure

PERSONAL AND PUBLIC TRANSPORT

Assignment No.3 Date due: ___/___/___

Power Generation and Distribution **Marks 50**

3.1 A schematic representation of the electrical power distribution network is shown below. Discuss three methods of producing electrical power. *(10)*

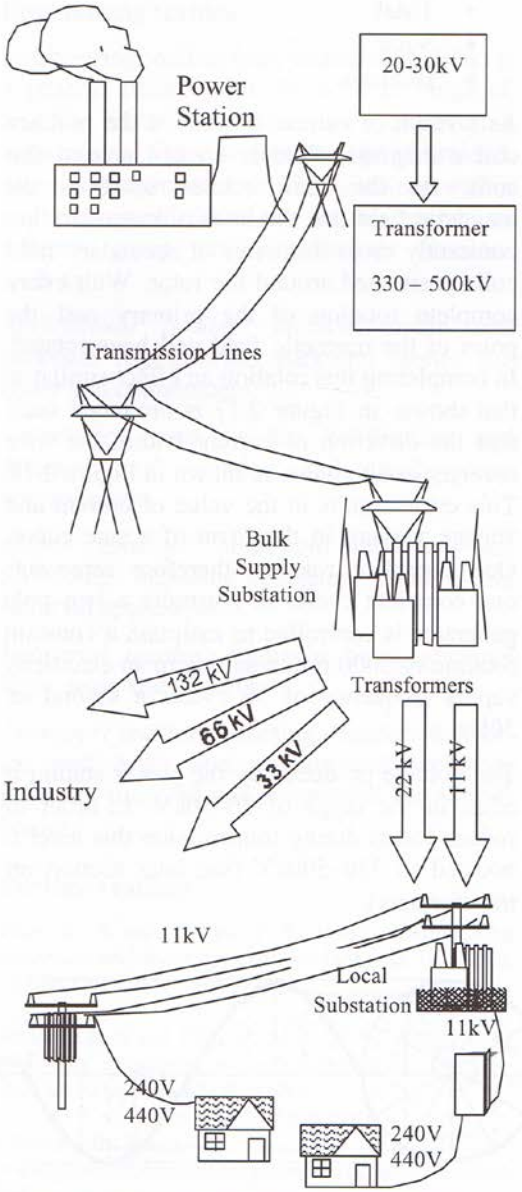


Figure 2.79 Schematic representation of the Electrical Power Distribution Network

3.2 How and where is electrical power produced for the Sydney area? (e.g. fossil fuel, hydro, solar or wing?) *(10)*

3.3 What is the difference between AC and DC current? (Use diagrams to explain) *(10)*

3.4 How is electricity distributed once it is produced? (A diagram would help) *(10)*

3.5 List and describe the types of **electric motors** available to engineers designing transport systems *(10)*

PERSONAL AND PUBLIC TRANSPORT

Assignment No.4 Date due: ___/___/___

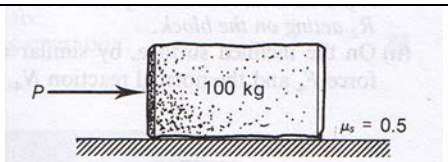
Engineering Mechanics **Marks 60**

4.1 **FRICTION:** *(18)*

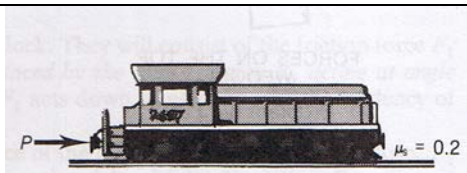
a) What is friction? (a diagram would help in your explanation) 2
b) What is the equation for the Angle of Static Friction? (the threshold of motion) 2
c) What is the formula for Friction 2

Attempt the following questions from Schlenker (pages 188-193)

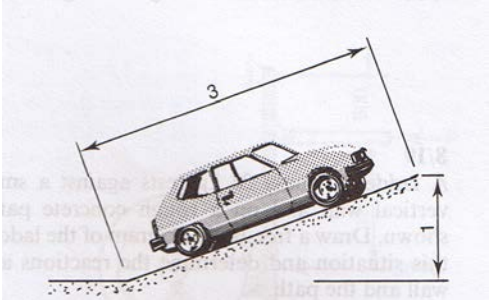
8/11

A block of stone of mass 100 kg is resting on a horizontal concrete path. Determine the horizontal force P necessary to just cause the block to slide if the coefficient of static friction is 0.5.	 Problem 8/11

8/13

A diesel locomotive is stationary on the track. Given that the mass of the locomotive is 45 tonnes, find the greatest drawbar pull that the locomotive can exert if the coefficient of friction between the wheels and rails is 0.2.	 Problem 8/13

8/15

A car of mass 1.2 tonnes is left stationary as shown on a concrete ramp of slope 1 in 3. The bonnet is bumped as the owner passes across in front of the car which then slides a short distance down the ramp. Determine the coefficient of static friction present between the wheels and the concrete.	 Problem 8/15

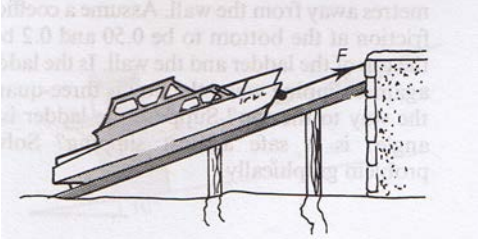
8/18

A boat of mass 2 tonnes rests on a slip which is inclined at 20° to the horizontal, the coefficient of static friction between the slip-rails and the boat being 0.3.

Determine the least force, F, needed in the winch cable to move the boat

(i) up the slip, and

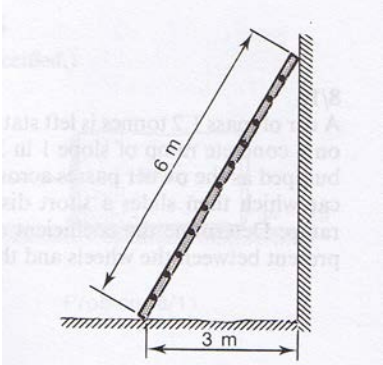
(ii) down the slip with constant velocity, given that the cable is parallel to the rails.



Problem 8/18

8/19

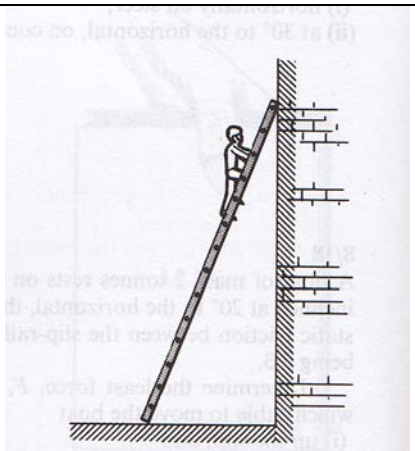
A ladder of mass 20 kg rests against a smooth vertical wall and on a rough concrete path as shown. Draw a free-body diagram of the ladder in this situation and determine the reactions at the wall and the path.



Problem 8/19

8/21

A boy of mass 45 kg places a 7-metre long ladder against a house with the bottom of the ladder 2.5 metres away from the wall. Assume a coefficient of friction at the bottom to be 0.50 and 0.2 between the top of the ladder and the wall. Is the ladder safe against slipping when the boy is three-quarters of the way to the top? Suppose the ladder is at 45° angle; is it safe against slipping? Solve this problem graphically.



Problem 8/21

4.2 **POWER,WORK AND ENERGY:** *(42)*

a) Define and state the formula for - Work..... 2

b) Define and state the formula for – Potential Energy 2

c) Define and state the formula for - Kinetic Energy 2

d) Define and state the formula for - Power..... 2
e) Define and state the formula for - Efficiency..... 2
f) What is meant by the term “Conservation of Energy”? 2

Attempt the following questions from Schlenker (pages 320-324 and 342-344)

14/15

State the type of energy possessed by the following objects: (i) a loose brick balanced on a wall of height 2 metres; (ii) a bullet travelling at 300 m/s; (iii) water in a dam that is used to drive a turbine; (iv) a rotating flywheel.	

14/16

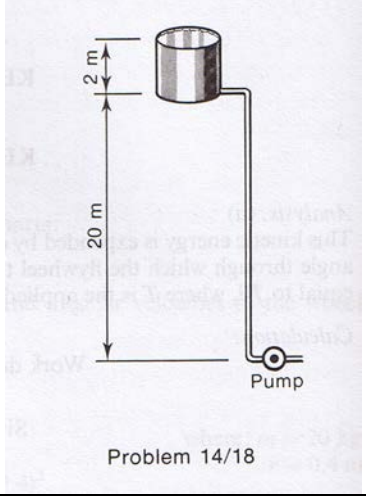
(i) Determine the work done against gravity when a mass of 50 kg is lifted 6 metres vertically. (ii) How much of this energy is lost when the mass falls 1 metre from this height?	

14/17

A boy of mass 70 kg climbs a cliff 30 metres high. (i) How much (useful) work has he done? (ii) What is his potential energy in relation to his starting point? (iii) If he dislodges a stone of mass 1 kg from the clifftop with what KE will it hit the ground?	

14/18

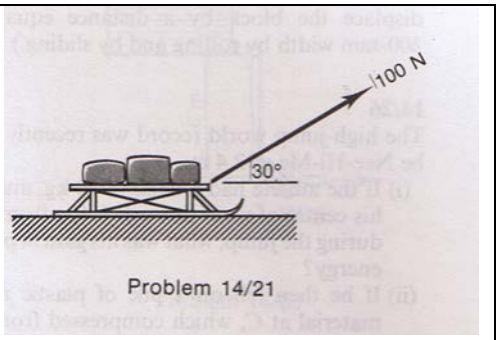
(i) A cylindrical water tank, 2 m high, contains 20000 litres of water when full. What is the potential energy of the water relative to an outlet point 20 m vertically below the bottom tank?
(ii) If the tank is refilled by means of a pump situated at the same level as the outlet, what is the useful work done by the pump? ,
Take the mass of 1 litre of water as 1 kg.



Problem 14/18

14/21

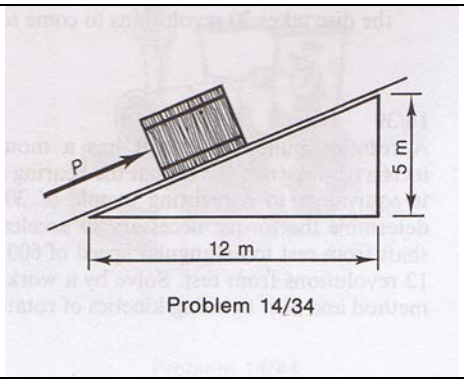
A sled of mass 10 kg is pulled 10 metres along level ground. The tension in the tow rope is 100 N and it is inclined at 30° to the ground as shown. Determine (i) the total work done;
(ii) the work done against friction, if the coefficient of friction between sled and ground is 0.3.



Problem 14/21

14/34

A crate of mass 50 kg is pushed 13 metres up an incline that rises 5 metres vertically over a horizontal distance of 12 metres. If the frictional resistance is constant at 120 N, calculate the work done on the crate.



Problem 14/34

PERSONAL AND PUBLIC TRANSPORT

Assignment No.5 Date due: ___/___/___

Materials Science **Marks 140**

5.1 **HEAT TREATMENT OF FERROUS METALS:** *(30)*

With the aid of microstructure &/or diagrams describe the following processes

a) Annealing 5
b) Normalising 5
c) Hardening 5
d) Air Hardening 5
e) Tempering 5
f) Surface Hardening 5

5.2 **MATERIAL FORMING PROCESSES:** *(70)*

With the aid of microstructure &/or diagrams describe the following processes

a) Forging 5
b) Hot Rolling (Give advantages and disadvantages) 5
c) Cold Rolling (Give advantages and disadvantages) 5
d) Ingot Casting 5
e) Continuous Casting 5
f) Sand Casting 5
g) Shell moulding 5
h) Centrifugal Casting 5
i) Gravity Die-Casting 5
j) Pressure Die-Casting 5
k) Investment Casting 5
l) The Full-Mould Process 5
m) Extrusion (Direct & Indirect and Impact Extrusion) 5
n) Powder Forming 5

5.3 **NON FERROUS METALS AND ALLOYS:** *(10)*

Attempt the following questions from Copeland Vol. 2, page 136

37 What are the advantages of aluminium lithium alloys?
38 What is brass?
39 Why is cartridge brass more ductile than Muntz metal?
40 Explain what is meant by the term aluminium bronze
41 How does precipitation hardening occur?

5.4 **CERAMICS, GLASSES, POLYMERS AND RUBBER:** *(30)*

Attempt the following questions from Copeland Vol. 2, page 136

a) What are some of the characteristics of Ceramics 2
b) What is a Clay-Body Ceramic? Give four examples 2
c) List four types of glasses. What are their properties? 2
d) What is Devitrification of Glass? 2
e) What is Glass Fibre? 2
f) In relation to Glass. What does the term “CREEP” mean? 2

g) Describe two heat Treatment Processes that can apply to Glass, what effect will these treatments have?. 4
h) What is the difference between p-type and n-type semiconductors? 2
i) What is the difference between thermoplastics and thermosets? 2
j) Explain what is meant by the term depletion zone? 4
k) What does the term “CROSS LINKING” in relation to polymers (Use diagrams to explain) 2
l) What is Rubber? 2
m) What does the term “VULCANISATION” mean? 2

Here are some links to some videos that I showed my kids as I was going through the different parts of the materials section of the Bio-Engineering unit. They are a great way to let the kids actually see what I’ve spent all that time talking about!

Sand Casting: http://www.youtube.com/watch?v=rgL2Jn5mk1A (quite good)

Shell Moulding: http://www.youtube.com/watch?v=W5mBiQMYt8E (not brilliant, but they get the idea)

Investment Casting: http://www.youtube.com/watch?v=BX8w-GUPz1w (a good one, after you get through the hard sell!)

Die Casting: http://www.youtube.com/watch?v=1AgDGLNE6Es (fair, but I suppose it’s a bit hard to see what goes on inside a machine!)

Drop Forging: http://www.youtube.com/watch?v=7fuHkxNPOLo (watch the lack of OH&S here... crazy!)

Press Forging: http://www.youtube.com/watch?v=678dcCTI0c8

Upsetting: http://www.youtube.com/watch?v=yKQXX9t7nZg

PERSONAL AND PUBLIC TRANSPORT

Assignment No.6 Date due: ___/___/___

Graphical Communication **Marks 10**

- 6.1 describe in your own words what CAD drawing is.
- Produce a CAD drawing of a cube with a hole in it. (Note: sizes do not matter)
- Describe in point form what the program you used is? Also describe how you produced your drawing. Ie: the steps you took to produce it