1MEM STUDENT ASSESSMENT TASKS

MEASUREMENT

ASSESSMENT CRITERIA

CONCEPTS & TECHNIQUES

E	D	C	B	A
CT1 Limited knowledge or understanding of mathematical information or concepts.	CT1 Basic knowledge and some understanding of simple mathematical information and concepts in some familiar contexts.	CT1 Knowledge and understanding of simple mathematical information and concepts in familiar contexts.	CT1 Knowledge and understanding of mathematical information and concepts in familiar and some unfamiliar contexts.	CT1 Knowledge and understanding of mathematical information and concepts in familiar and unfamiliar contexts.
CT2 Attempted application of basic mathematical skills or techniques, with limited accuracy in solving routine problems.	CT2 Application of basic mathematical skills and techniques to find partial solutions to routine problems in some contexts.	CT2 Application of some mathematical skills and techniques to find solutions to routine problems in familiar contexts.	CT2 Effective application of mathematical skills and techniques to find mostly accurate solutions to routine and some complex problems in a variety of contexts.	CT2 Highly effective application of mathematical skills and techniques to find efficient and accurate solutions to routine and complex problems in a variety of contexts.
CT3 Some gathering and attempted representation of simple data in a familiar context.	CT3 Some gathering, representation, and basic interpretation of simple data in familiar contexts.	CT3 Gathering, representation, and interpretation of data in familiar contexts.	CT3 Gathering, representation, and interpretation of data in familiar and some unfamiliar contexts.	CT3 Gathering, representation, and interpretation of a range of data in familiar and unfamiliar contexts.
CT4 Attempted use of electronic technology to find a solution to a routine problem.	CT4 Some appropriate use of electronic technology to find solutions to routine problems.	CT4 Generally appropriate and some effective use of electronic technology to find solutions to routine problems.	CT4 Mostly appropriate and effective use of electronic technology to find mostly accurate solutions to routine and some complex problems.	CT4 Appropriate and effective use of electronic technology to find accurate solutions to routine and complex problems.

REASONING & COMMUNICATION

RC1 Limited interpretation of mathematical results.	RC1 Some interpretation of mathematical results in some familiar contexts.	RC1 Generally accurate interpretation of mathematical results in familiar contexts.	RC1 Mostly accurate interpretation of mathematical results in familiar and some unfamiliar contexts.	RC1 Accurate interpretation of mathematical results in familiar and unfamiliar contexts.
RC2 Limited awareness of the use of mathematical reasoning in solving a problem.	RC2 Attempted use of mathematical reasoning to consider the appropriateness of solutions to routine problems.	RC2 Appropriate use of mathematical reasoning to draw conclusions and consider the appropriateness of solutions to routine problems.	RC2 Effective use of mathematical reasoning to draw conclusions and consider the appropriateness of solutions to routine and some complex problems.	RC2 Highly effective use of mathematical reasoning to draw conclusions and consider the appropriateness of solutions to routine and complex problems.
RC3 Limited use of mathematical notation, representations, or terminology.	RC3 Some use of familiar mathematical notation, representations, and terminology.	RC3 Generally appropriate use of familiar mathematical notation, representations, and terminology.	RC3 Mostly accurate use of appropriate mathematical notation, representations, and terminology.	RC3 Proficient and accurate use of appropriate mathematical notation, representations, and terminology.
RC4 Attempted communication of an aspect of mathematical information.	RC4 Attempted communication of simple mathematical ideas and information.	RC4 Appropriate communication of mathematical ideas and information.	RC4 Clear and appropriate communication of mathematical ideas and information to develop some logical arguments.	RC4 Clear and effective communication of mathematical ideas and information to develop logical and concise arguments.

TOPIC OVERVIEW

ESSENTIAL MATHEMATICS

SUBJECT: MEASUREMENT

ASSESSMENT TYPE: 1: SKILLS & APPLICATIONS

DESCRIPTION: In this assignment you will apply various measuring skills to a range of different contextualized applications.

This assignment has FOUR tasks:

- Task 1: LINEAR MEASUREMENT
- Task 2: MEASURING CUBOIDS
- Task 3: MEASURING SPHERES, CONES AND CYLINDERS
- Task 4: MEASURING ENERGY

As you work through the tasks in this assignment, you need to record all of your working to provide clear evidence of the steps you have taken to arrive at a solution.

ASSESSMENT CRITERIA:

CT2	Application of mathematical skills and techniques to find solutions to practical problems in context
CT3	Gathering, representation and interpretation of data
CT4	Use of electronic technology to find solutions to problems
RC3	Use of mathematical notation, representations and terminology

1.

LINEAR MEASUREMENT

Task. For two selected logos, use appropriate measuring equipment to measure and record as many linear measurements as you can using appropriate units of measurement

- Measure all straight lines
- Find the radius of all curved lines
- Measure lengths and widths of key shapes
- Measure any relevant negative spaces

Here is an example:

Insert an example from the internet.
Available options include:

- 1971 ‘Shell’ logo by Raymond Loewy
- 1977 ‘Apple’ logo by Rob Janoff

Provide students with copies of a range of corporate logos to select from. For example:

- ‘NITV’ logo,
- ‘Facebook’ logo
- ‘Twitter’ logo

… or similar.

Extension task:
Use the measurements you have obtained to recreate one of these logos in Adobe Illustrator or similar

2.

MEASURING CUBOIDS

Task. For shapes a, d and e:

- Estimate the total surface area of the shape in cm^2
- Calculate the surface area of the front surface in cm^2
- Calculate the total surface area of the shape in cm^2
- Calculate the volume of each cubiod in cm^3

- Using the formula 1 inch ≈ 2.5cm , calculate the volume of each cuboid in $inches^3$
  Show all of your working

For shapes b, c and f:

- Estimate the volume of each cuboid in ml
- Calculate the surface area of the front surface in cm^2
- Calculate the total surface area of the shape in cm^2
- Calculate the volume of each cubiod in cm^3

- Calculate the capacity of each cuboid in ml - (1000 cubic cm = 1000 ml (1 litre))
  Begin by estimating the thickness of the packaging material and deducting this from your measurements
  Show all of your working


a
h – 9.5cm
l –22.5cm
d – 11.5cm
b
h – 22cm
l – 6.5cm
d – 6.5cm
c
h – 196mm
l – 70mm
d – 70mm
d
h – 61mm
l – 76mm
d – 25mm
e
h – 58mm
l – 58mm
d – 39mm
f
h – 90mm
l – 50mm
d – 50mm
AQUA
Pauls
zymil
easy to digest
lactose free
gluten free
ecostore
Simply Organic
ethique
TIP TO TOE

3.

MEASURING SPHERES, CONES & CYLINDERS

Task. For shapes a, c and d:

- Calculate the surface area of one circular face of each cylinder
- Calculate the volume of each cylinder in cm^3

- Calculate the capacity of each cylinder in ml - (1000 cubic cm = 1000 ml (1 litre))
  Begin by estimating the thickness of the vessel walls and deducting this from your measurements
  Show all of your working

For shapes b, f and h:

- Calculate the surface area of each circular face of each truncated cone
- Calculate the volume of each truncated cone in cm^3

- Calculate the capacity of each truncated cone in ml - (1000 cubic cm = 1000 ml (1 litre))
  Begin by estimating the thickness of the vessel walls and deducting this from your measurements
  Show all of your working

For shape g:

- Calculate the surface area of the sphere
- Calculate the volume of the sphere in cm^3

- Calculate the capacity of the sphere in ml - (1000 cubic cm = 1000 ml (1 litre))
  Begin by estimating the thickness of the vessel walls and deducting this from your measurements
  Show all of your working

For shape e:

- Calculate the surface area of the eliptoid
- Calculate the volume of the eliptoid in cm^3

- Calculate the capacity of the eliptoid in ml - (1000 cubic cm = 1000 ml (1 litre))
  Begin by estimating the thickness of the vessel walls and deducting this from your measurements
  Show all of your working


a
h – 85mm
C – 90mm
D – 180mm
b
h – 38cm
D1 – 21cm
D2 – 18cm
c
h – 172mm
C – 47mm
d
h – 19cm
Ø - xxxmm
e
h – 92mm
C1 – 46mm
C2 – 42mm
C3 – 42mm
f
h – 8cm
Ø1 – 5cm
Ø2 – 11cm
g
Ø – 80mm
h
h – 75mm
D1 – 65mm
D2 – 50mm

4.

MEASURING ENERGY

Tasks.

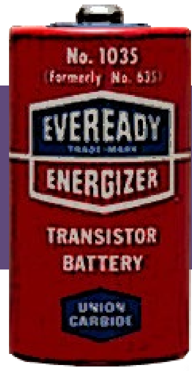
1. **Select 6 to 10 plug-in household electrical appliances that are used in your home.**
    - Use the website www.energyrating.gov.au or the general internet to determine the amount of electical energy, in kilowatts (kW) each appliance typically uses
    - Estimate the average number of hours your household uses each appliance for each week
    - Calculate the number of kilowatt hours used per week for your selected electrical appliances using the following formula for conversion between power and energy:
        i. energy = power(kW) * time
        ii. or, kilowatt hour (kWh) = power (kW) * hour (h)
        iii. or (because there are 1000 watts in a kilowatt kwh = (W * h) /1000

        (because you are calculating the number of kWh per week, hours (h) will be the number of hours per week that you use each appliance)
    - Organise the data you have gathered into a table in Excel and create a bar graph to compare the energy consumption of each appliance
    - Record some conclusions about the energy consumption of the appliances you have compared (most power hungry, most economical etc)

2. **Select the electical appliance from task 1 that is the least energy efficient**
    - Work through the same steps you went through in Task 1 (including creating a bar graph in Excel) to compare a selection of 4 to 6 comparable variations of the same appliance (fridges, for example) from a range of different brands to find the most energy efficient option
    - Based on a cost of 40 cents per kWh, measure and compare the cost of running each appliance in your house for a year
    - Determine how much money your household could save per year using the most energy efficient appliance compared with the least energy efficient appliance
    - Find the cost of the most energy efficient appliance and determine how long it would take for you to make back the money you might spend switching from the least energy efficient appliance to the most energy efficient appliance

5.

ENERGY DRINK - DESIGN HACK



HACK 1.

Beverage company ‘Hoopla’ want you to create packaging designs for a new range of ‘energy’ drinks and iced coffees. Hoopla don’t want their product marketed as being unhealthy high sugar, high caffene products. Rather, they want to market their products as high energy hits, with ‘double the energy’ of competitors products. To achieve this, they want their cans to be design hacks of battery packaging designs.

- **Their 250ml energy drink cans need to be scaled to the proportions of ‘A’ batteries**
- **Their 500ml iced coffee drink cans need to be scaled to the proportions of ‘C’ batteries**

- Determine an appropriate unit of measurement and create an accurate, to scale’ diagram of an ‘AA’ and ‘C’ battery, including circle radius and circumference measurements
- For one can size, record measurements for typography and other design elements for a selected battery design
- For both can sizes, determine the volume of a drink can if it was the same size as each battery
- Calculate the scale factor needed to achieve the correct proportions to create an:
  i. ‘A’ battery proportion 250ml can
  ii. ‘C’ battery proportion 500ml can
- Accurately measure to create a ‘to scale’ shape net for each can size
- For one can size, create a desigh hack energy drink package design, replicating the scaling and look of the styling and typography elements from a selected battery design

HACK 2.

Hoopla need to put a positive spin on some negative nutritional information.To achieve this, they want you to create a design hack of the Australain Energy Rating Label, with the star rating showing the percentage of daily energy consumption per serve.

- Research to determine appropriate daily energy consumption for a person of a selected age
- Research to determine the amount of kilojoules needed to be double that of a standard energy drink or iced coffee
- Calculate the percentage of daily energy intake from consumption of a can of Hoopla energy drink or iced coffee
- Calculate how to represent this information in degrees on a 180° degree semicircle
- Create your design hack energy star label and incorporate it into your can design