Tutorial 5

Calculations – Some Pointers

- Units
  - Must be consistent
  - Use SI units
- Show working
  - Shows how you approached question
  - If method OK you'll get marks even if the answer is not correct
- Check

SI Units

- *Le Système International d'Unités*
- Base units
- Derived units
- See http://physics.nist.gov/cuu/Units/

SI Base Units

length	metre	m
mass	kilogramme	kg
time	second	s
electric current	ampere	A
thermodynamic temperature	kelvin	K
amount of substance	mole	mol
luminous intensity	candela	cd

SI Derived Units

area	square meter	m^2
volume	cubic meter	m^3
speed, velocity	meter per second	m/s
acceleration	meter per second squared	m/s^2
mass density	kilogram per cubic meter	kg/m^3
current density	ampere per square meter	A/m^2
luminance	candela per square meter	cd/m^2

SI Derived Units

force	newton	N	-	$m \cdot kg \cdot s^{-2}$
pressure, stress	pascal	Pa	N/m^2	$m^{-1} \cdot kg \cdot s^{-2}$
energy, work,	joule	J	N·m	$m^2 \cdot kg \cdot s^{-2}$
power, radiant flux	watt	W	J/s	$m^2 \cdot kg \cdot s^{-3}$

Determining Metabolic Rate

- See Energy File Part 3 Page 6

Calculating Basal Metabolic Rate

Age range	Males (MJ day^{-1})	Females (MJ day^{-1})
0-3	0.255M – 0.226	0.255M – 0.214
3-10	0.095M + 2.07	0.094M + 2.09
10-17	0.074M + 2.754	0.056M + 2.898
18-29	0.063M + 2.896	0.062M + 2.036
30-59	0.048M + 3.653	0.034M + 3.538
>60	0.049M + 2.459	0.038M + 2.755

Where M is body mass in kg

Example

Calculate the BMR for a man of 47 who weighs 85 kg

From table 2.1 in Energy File – Part 3

BMR = 0.048M + 3.653

= (0.048 x 85) + 3.653

= 4.08 + 3.653

= 7.733 MJ day $^{-1}$

Exercise 1

Calculate the BMR for a woman of 26 who weighs 60 kg

Exercise 1 - Solution

Calculate the BMR for a woman of 26 who weighs 60 kg

BMR = 0.062M + 2.036

= (0.062 x 60) + 2.036

= 3.72 + 2.036

= 5.756 MJ day $^{-1}$

BMR Multipliers

Activity	Multiplier
Sitting	1.3
Standing	1.5
Washing, Dressing	3.3
Walking slowly	2.8
Walking quickly	4.6
Walking upstairs	8.3
Light work	3.3
Moderate work	5.4
Strenuous work	7.6

Exercise 2

- Calculate the energy expenditure of a 26 year old woman weighing 60 kg while she undertakes light work for a total of 7 hours

Exercise 2 - Solution

We have already determined during exercise 1 that this woman's BMR is 5.756 MJ day $^{-1}$

As she only works for 7 hours, we need to know what her hourly BMR is

BMR = 5.756 / 24 MJ hour^{-1}

= 0.240 MJ hour^{-1}

Exercise 2 – Solution

Over 7 hours her BMR = 7 x 0.240 MJ

= 1.68 MJ

For light work, the multiplier is 3.3

So, the total energy expenditure during 7 hours of light work = 3.3 x 1.68 MJ

= 5.54 MJ

Report Writing

- Some general advice

Report Writing

- Preparation
- Presentation
- Use of tables and diagrams
- Referencing

Preparation

- Read question carefully
- Answer the question given!
- Gather data
- Decide on structure
- Plan

Presentation

- Structure
  - Headings and sub-headings
  - Paragraphs
- Use tables and diagrams
  - Where appropriate!
- Spacing
- Margins

Tables and Diagrams

- Use to present and summarise data
- Good tables and diagrams can
  - make it easy for reader to understand information
  - save on word count

Tables and Diagrams

- Think carefully about
  - information you want to convey
  - type and design
  - location
- Titles and labelling
  - always give a title
  - clear labelling

This is my travel diary for the w/c/ 12 June 2004

How can I simply it to present a summary of the information for a report on my travel pattern and associated energy consumption?

Travel Diary w/c 12 June 2004						
Day	**Purpose**	**Mode**	**Occupancy**	**Distance(km)**	**MJ km-1**	**Energy(J)**
Saturday	Taking daughter to school to catch coach for school trip	Car(Passat estate)	2	8	1.9	15.2
Saturday	Driving back from school	Car(Passat estate)	1	8	3.8	30.4
Saturday	Shopping in Wigan town centre	Walking	N/a	6	0.14	0.84
Saturday	Visit to supermarket to pick up a few items	Walking	N/a	2	0.14	0.28
Saturday	Taking son to guitar lesson and back	Car(Peugeot 206)	2	16	1.25	20
Sunday	Driving to rugby match and back	Car(Peugeot 206)	2	10	1.25	12.5
Sunday	Walking from car park to stadium and back	Walking	N/a	1	0.14	0.14
Monday	Driving to Chester	Car(Passat Estate)	1	64	3.8	243.2
Monday	Driving home from Chester	Car(Passat Estate)	1	64	3.8	243.2
Tuesday	Driving to office	Car(Passat Estate)	1	8	3.8	30.4
Tuesday	Driving home from office	Car(Passat Estate)	1	8	3.8	30.4
Wednesday	Driving to Chester	Car(Peugeot 206)	1	64	2.5	160
Wednesday	Driving home from Chester	Car(Peugeot 206)	1	64	2.5	160
Wednesday	Driving out to Standish for a meal out	Car(Peugeot 206)	4	8	0.62	4.96
Wednesday	Driving home	Car(Peugeot 206)	4	8	0.62	4.96
Thursday	Driving to Chester	Car(Peugeot 206)	1	64	2.5	160
Thursday	Driving home from Chester	Car(Peugeot 206)	1	64	2.5	160
Friday	Driving to Chester	Car(Passat Estate)	1	64	3.8	243.2
Friday	Driving from Chester to Orrell	Car(Passat Estate)	1	62	3.8	235.6
Friday	Driving from Orrell to home	Car(Passat Estate)	1	8	3.8	30.4
Friday	Trip to supermarket and back to pick up bottle of wine	Walking	N/a	2	0.14	0.28

Mode	Occupancy	Number of trips	Total distance travelled during week (km)	J km^{-1}	Energy (J)
Car (Passat estate)	1	8	286	3.8	1086.8
Car (Passat estate)	2	1	8	1.9	15.2
Car (Peugeot 206)	1	4	256	2.5	640
Car (Peugeot 206)	2	2	26	1.25	32.5
Car (Peugeot 206)	4	2	16	0.62	9.92
Walking	N/a	4	11	0.14	1.54

Referencing

- In text
  - Author's name and date
  - e.g. Smith (1998); Smith and Jones (2002)
- In bibliography
  - Full details
  - Format depends on reference type

Referencing

- For further details see

http://library.open.ac.uk/help/helpsheets/cite.html

Example

- In Text
  - Morris D and Carr S (2002, P37)
- In bibliography
  - Morris D and Carr S (2002) *T172 Theme 3; Food Chains,* Milton Keynes,The Open University