Shedding Light on Energy Episode 2: Measuring Energy   Name: _____

Part A

1. In a light globe, _____ energy is transformed into _____ energy.
2. In a wood fire, the _____ energy in the wood is transformed mainly into _____ energy and _____ energy.

Part B

3. Fill in the table below.

Quantity	Unit Name	Unit Symbol	Quantity	Unit Name	Unit Symbol
length	metre	m	temperature		
energy			volume		L
mass		kg	time		s

4. If 1 kilogram of water heats up from 20°C to 21°C it has absorbed _____ Joules of energy.
5. If 1 kilogram of water heats up from 20°C to 22°C it has absorbed _____ Joules of energy.
6. If 1 kilogram of water heats up from 40°C to 60°C it has absorbed _____ Joules of energy.

7. 1000 J = _____ kJ, 4200 J = _____ kJ, 7.9 kJ = _____ J, 0.5 kJ = _____ J.

8. If 1 kilogram of water heats up from 50°C to 51°C it has absorbed _____ Joules of energy.
9. If 2 kilograms of water heats up from 50°C to 51°C it has absorbed _____ Joules of energy.

10. The equation to calculate the amount of energy absorbed by water is:
    Energy absorbed = _____
11. Fill in the table below.

Mass of water (kg)	Initial Temperature (°C)	Final Temperature (°C)	Temperature Change (°C)	Energy Absorbed (J)	Energy Absorbed (kJ)
1	40	60			
1	20	100			
2	20	100			
5	15		85		

Part C

12. Our bodies get the energy that they need from _____.
13. Describe what <u>energy intake</u> is. _____
_____
14. Our bodies require about _____ Joules of energy per second when we are sitting down.
15. List 3 processes within our bodies or activities that need energy to occur. _____
_____
_____
_____
_____

16. Fill in the table below.

ACTION	Approximate Energy Expenditure			
	Joules/second (J/s)	Joules/minute	kilojoules/minute	kilojoules per hour
Sitting still	100	6,000	6	360
Standing still	120			
Walking 3 km/hr	210			
Walking 5 km/hr	300			
Running 9 km/hr	700			
Running 16 km/hr	1300	78,000	78	4680
Cycling 9 km/hr	300			
Cycling 16 km/hr	500			

17. Approximately how much energy do we typically expend per day? _____
18. How do scientists determine how much energy we use to perform different actions? _____
_____
_____
_____
_____

19. A typical person needs an energy intake of about _____ per day.
20. Fill in the table below.

Nutrient	Energy Content	
	kilojoules/gram (kJ/g)	kilojoules/kilogram (kJ/kg)
Carbohydrates		
Fats and Oils		

21. A kilogram of carbohydrates contains enough energy to fuel a typical person for about _____ days.
22. Fill in the table below. (The calculation is a two-step calculation.)

Food	Amount	Energy Content (total) (kilojoules, kJ)	Energy Content (kJ/100 mL or kJ/100 g)
milk	250 mL	650	
bread (2 slices)	76 grams	740	
egg (boiled or raw)	55 g	610	
avocado (1 whole)	220 g	1300	

23. How is the energy content in food determined? Use a diagram and text.
_____
_____
_____
_____
_____

24. (a) A typical egg contains about _____**kJ** of energy. Walking at 5 km/hr requires about _____ **kJ/min**.
    (b) How much walking time (in minutes) will it take to use up the chemical energy in the egg?
_____

25. A 50 g block of chocolate contains 1125 **kJ**. How much time will you have to run (at 9 km/hr, which uses up about _____ **kJ/min**) to burn it off?

26. What is cellular respiration? _____
_____

27. Complete the basic chemical equation that describes cellular respiration.

glucose (carbohydrates)
   OR   **+ oxygen** → _____ _____ + _____
   fat

28. All of the _____ _____ produced in cellular respiration and a lot of the _____
    are expelled from the body via _____
_____

29. If, over time, our energy intake is greater than our energy expenditure, we _____.
30. If, over time, our energy intake is less than our energy expenditure, we _____.
31. When people lose weight, where do the atoms that had made up the fat molecules actually go? (see Q27)
_____
_____

32. If, over time, our energy intake is the same as our energy expenditure, we _____.
33. Explain why people often put on extra weight (fat) as they get older. _____
_____
_____

34. Explain how people (who are wishing to lose weight) can reduce their energy intake without eating less food.
_____
_____