

1. Light bulbs lose a lot of their energy as heat to the surroundings. A 40 W light bulb provides 120 J of luminous energy when it runs for 1 minute. Find its energy efficiency.

$$E = P \times \Delta t = 40 \text{ W} \times 60 \text{ s} = 2\,400 \text{ J}$$

$$\text{Efficiency} = \frac{120 \text{ J}}{2\,400 \text{ J}} \times 100 = 5\%$$

2. Four enthusiastic science students have a remote control car race. The following table gives information about the distance covered by each car at different moments in the race

Car	Distance Covered (m)	Time (s)
1	18	5
2	21	4
3	24	9
4	16	10

Which car had the highest average speed?

$$v = d/t \quad \text{Car 1} = 3.6 \text{ m/s} \quad \text{Car 2} = 5.36 \text{ m/s} \quad \text{Car 3} = 2.7 \text{ m/s} \quad \text{Car 4} = 1.6 \text{ m/s}$$

Car #2 has the highest average speed.

3. While conducting a test a technician notices that an electrical device consumes 720 000 J of energy, but wastes 230 000 J when in use. What is the energy efficiency of this device?

$$720\,000 - 230\,000 = 490\,000$$

$$\text{Efficiency} = \frac{490\,000}{720\,000} \times 100 = 68\%$$

4. You were running to get to class on time! Your speed was 0.8 m/s. You are 178 m away from class and you have 3 minutes until the bell rings. Will you make it on time? Show your work to justify your answer.

$$3 \text{ min} \times 60 \text{ s} = 180 \text{ s} \quad v = \frac{d}{\Delta t} \quad v = 0.8 \text{ m/s} \text{ and } \Delta t = 180 \text{ s} \quad \text{So } 0.8 \text{ m/s} \times 180 \text{ s} = 144 \text{ m}$$

You will be at 144 m when the bell rings SO>>>>> no you will not make it on time ☹

5. Your weight on earth is 735 N, whereas your weight on planet X is 279 N.

a) What is the intensity of the gravitational field on the surface of planet X.

b) Which planet is it? P82

$$F = mg$$

$$735 = m \times 9.8$$

$$m = 75 \text{ kg}$$

$$F = mg$$

$$279 = 75 \times g$$

$$g = 3.72 \text{ N/kg}$$

$$\text{because } (279 \div 75 = 3.72) \rightarrow \text{Mars}$$

Ch 4

1. List 5 signs that a chemical change has occurred.

1. release of a gas
2. emission or absorption of heat/light
3. increase/decrease in mass
4. change in colour
5. formation of a precipitate

2. Two molecules of ethane gas (C₂H₆) react with seven molecules of oxygen gas to produce four molecules of carbon dioxide and six molecules of water vapour. Write out the chemical equation using the proper notation (formula & put the phase (g, s, l, aq) in brackets).



3. Combustion requires the perfect combination of certain conditions. Draw the "triangle of fire" and explain the three components.

Oxidation agent (O₂) – you need oxygen for the fuel to burn

Fuel – you need wood, propane, diesel etc to burn. These substances have chemical energy stored in their bonds.

Ignition temperature – is the minimum temperature needed for the fire to start on its own. Ex spontaneous combustion. We start most fires with a match or spark which usually exceeds this temperature!

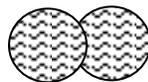
4. Draw the particle model for



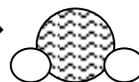
Hydrogen = ○



+



→



Oxygen =

