



The Science Scribe

Designed by Lian Soh

Instructions & Notes

This document is natively in A4 and has an absolute minimum of 0.5 cm margins and should print on most commercial home-use printers.

SPECIAL!!!

Students, tell your teachers!

Teachers, listen up!

Every term The Science Scribe has excess resources to clear out of its inventory. We don't do "sales" like greedy resource companies because that's not our philosophy: instead, we do **freebies!**

Teachers need to send an email to info@sciencscribe.co.nz

The email must:

- Come from a school email address
- Contain information about the year level and science subject name (e.g: Level 2 Biology).
- State how many students will need resources (E.g: Lv2 Bio - 27 students, 2 teachers)
- Contain some form of annual calendar that shows when assessments for certain topics are taking place (including practice tests) or when topics are starting/ending. Ballpark date estimates are okay!

We only use this information so we can send resources to places that need them the most! It does not guarantee your class resources.

Legal Notice

All items contained here and created by Lian Soh for the Science Scribe are subject to copyright with all rights reserved to Lian Soh.

You may use these flash cards to:

- Print or photocopy yourself a personal copy at home for revision and study.
- Print or photocopy a class set if you are teaching at a school or tutoring centre.
- Show in a school via a projector.

You may not:

- Trade Science Scribe resources for services, goods or money unless granted written permission by Lian Soh.
- Edit, cut or copy The Science Scribes' resources in part or in full.

The Science Scribe is a registered trademark in New Zealand.

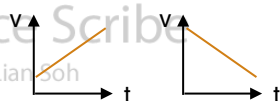
If in doubt, contact info@sciencscribe.co.nz

Speed vs Time Graphs

- **Horizontal (flat) Line:** moving at constant speed; the object has no acceleration and no net forces



- **Straight Line:** non-constant speed; the object is changing speed so it is accelerating or decelerating. There is a net force.



- **Area:** the area under the line tells you the distance travelled.

Area of a rectangle: length x width
Area of a triangle: $\frac{1}{2}$ x base x height



youtu.be/MQuEHQxZoQ4

sciencscribe.co.nz
© Lian Soh 2014

Work

- **Work** is done when a force is applied to move something a certain distance.
- **Energy conversion** always occurs when work is done. Example: If an object falls, work is done because gravitational potential energy is converted into kinetic energy.
- **The unit for work is in J (joules).** This is the same as the unit for energy.

$$W = F d$$

symbol	name	units
W	work done	J
F	force	N
d	distance	m



youtu.be/obc8-uMBaOk

sciencscribe.co.nz
© Lian Soh 2014

Acceleration

- Acceleration** is defined as a *change in velocity* over a change in time.
- A *change in velocity* means that something moves at **non constant speed**.
- Δ is read as "change in"
- The **gradient (slope/steepness) of a velocity vs time graph** equals acceleration. *Note: the total area under a velocity vs time graph equals the total distance travelled.*

$$a = \frac{\Delta v}{\Delta t}$$

symbol	name	units
a	acceleration	ms ⁻²
v	velocity	ms ⁻¹
t	time	s

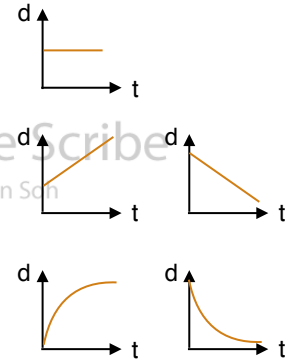


youtu.be/TFaTPxtmT50

sciencescribe.co.nz
© Lian Soh 2014

Distance vs Time Graphs

- Horizontal (flat) Line:** stopped or stationary, the object has no acceleration and no net forces.
- Straight Line:** constant velocity; the object has no acceleration and no net forces.
- Curved Line:** non-constant velocity; the object is changing speed which means it is accelerating/decelerating. There is a net force.



youtu.be/9keMUFKhcS0

sciencescribe.co.nz
© Lian Soh 2014

Energy (kinetic)

- Kinetic Energy:** is active energy. It is the energy possessed by an object in motion.
- Mass** is directly proportional to the kinetic energy. This means that doubling the mass will double the kinetic energy.
- Velocity** is proportional to the kinetic energy such that doubling the velocity will quadruple the kinetic energy.

$$E = \frac{1}{2} m v^2$$

symbol	name	units
E	energy	J
m	mass	kg
v	velocity	ms ⁻¹



youtu.be/-LVnV_hui0U

sciencescribe.co.nz
© Lian Soh 2014

Energy (grav. pot.)

- Lifting an object** means *work is done* to raise it. As it is raised it gains gravitational potential energy.
- Potential energy** is *stored energy* because it has the ability to be released to do work.
- Dropping an object** will change **most** of the stored gravitational potential energy into kinetic energy. The rest is changed into small amounts of heat and sound caused by friction with air.

$$E = m g h$$

symbol	name	units
E	energy	J
m	mass	kg
g	acceleration by gravity	ms ⁻²
h	height	m



youtu.be/ORc9Y2fehPw

sciencescribe.co.nz
© Lian Soh 2014

Forces

- Forces** can change an objects' speed or direction.
- Net Force** is an *overall force*. There is a net force when all forces on an object are unbalanced. If something has a net force it will accelerate or decelerate.
- Weight** is the force caused by the downward acceleration due to gravity: 10 N kg^{-1}
- Weight** is given in N, **mass** is in kg.

$$F = m a$$

symbol	name	units
F	force	N
m	mass	kg
a	acceleration	ms ⁻²



Common names of forces:
 ↓ weight ↗ thrust and drag
 ↑ support, upthrust, air resistance, buoyancy (for floating objects)

youtu.be/b8oSYQG4NiY

sciencescribe.co.nz
© Lian Soh 2014

Power

- Power** describes how much work is done per second. It is the rate of energy used/converted.
- The **unit for power is W (watts)**. The other unit is Js⁻¹
- The **symbol for power is P**. This is the same as the symbol for pressure. don't get caught out by this in your exam!
- If **something has high power** it can do a lot of work in lesser time.

$$P = \frac{W}{t}$$

symbol	name	units
P	power	W
W	work done	J
t	time	s



youtu.be/H8VZubIEV5g

sciencescribe.co.nz
© Lian Soh 2014

Pressure

- Pressure** in L1 science deals with applying a force over a specific area.
- Smaller areas** will give a higher pressure and **larger areas** will give a smaller pressure for the same amount of force.

$$P = \frac{F}{A}$$

symbol	name	units
P	pressure	Pa
F	force	N
A	area	m ²

Area Conversions:

$$\text{mm}^2 \xrightleftharpoons[\times 100]{\div 100} \text{cm}^2 \xrightleftharpoons[\times 10000]{\div 10000} \text{m}^2$$



youtu.be/jXrL2q3Lgew

sciencescribe.co.nz
© Lian Soh 2014

Velocity

- Velocity** is defined as a change in distance over time.
- Constant velocity** means that an objects velocity is **not** changing; therefore it is not accelerating or decelerating.
- Non-constant velocity** means that an objects velocity is changing; therefore it is accelerating or decelerating
- The **gradient (slope) of a distance vs time graph** gives you the velocity

$$v = \frac{d}{t}$$

symbol	name	units
v	velocity	ms ⁻¹
d	distance	m
t	time	s



youtu.be/hyHFyID00OU

sciencescribe.co.nz
© Lian Soh 2014