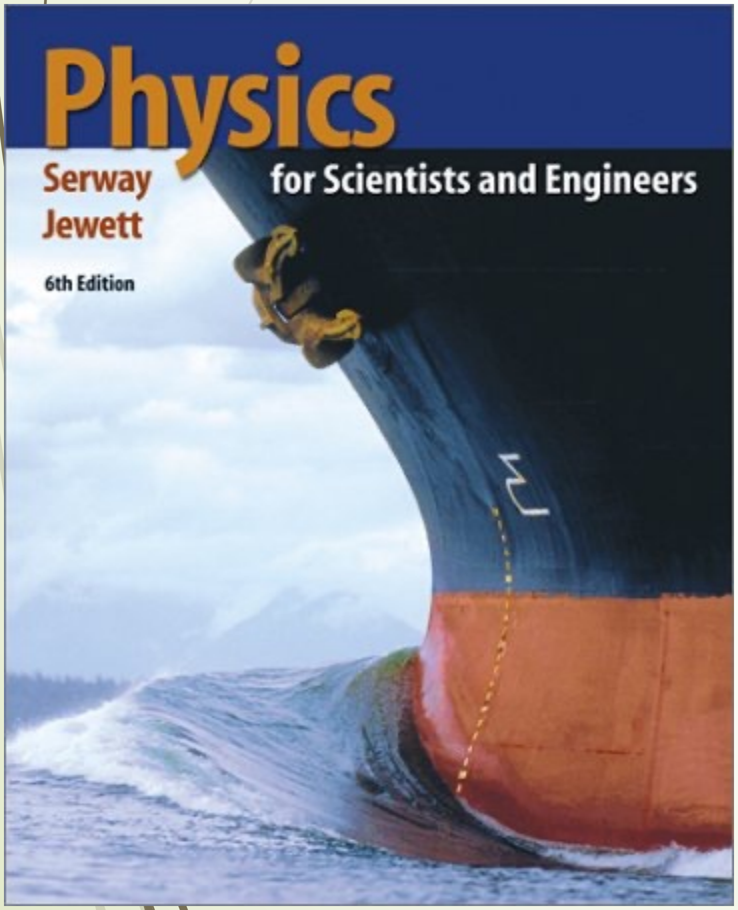
Physics 101

Faculty of Sciences – Physics Department

Schedule of Assessment Tasks for Students During the Semester

	Assessment task (e.g. essay, test, group project, examination, speech, oral presentation, etc.)	Week Due	Proportion of Total Assessment
	Theoretical		
1	Midterm Written Exams	From 5th week	20 %
2	Quizzes, class participation and home assignments.	From 2nd week	10 %
3	Final exam	16	40 %
	Practical		
5	Experiments reports	weekly	10%
6	Quizzes	From 4th week	5%
7	Final	14	15%
	Total		100 %

Course Book



Physics for Scientists and Engineers

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(7^{th} edition)

CHAPTER :1

MECHANICS

Units and Dimensions

Motion in One Dimension

PHYS 101

Units &Dimensions

- Base and Derived Units
- Definition of SI Units
- Scalar and Vector Quantities
- Dimensional Analysis

Motion in One Dimension

- Displacement
- Average and Instantaneous Velocity
- Average and Instantaneous Acceleration

Topics to be covered

PHYS 101

• Objectives

- In the first part of this chapter you will learn:
- The difference between base and derived units
- How you can use units to check equations
- How to use significant figures
- How to deal with vectors
- In the second part you will learn
- How to describe motion in terms of distance , displacement, speed, velocity, acceleration and time

Introduction

The basic laws of physics involve such physical quantities as force, velocity, volume, and acceleration, all of which can be described in terms of more fundamental quantities.

In mechanics, the three most fundamental quantities are **length** (L), **mass** (M), and **time** (T).

All other physical quantities can be constructed from these three.

Metric Unit of Measure	
Measures of Length	
1 meter (m)	= 1000 millimeters (mm)
1 meter (m)	= 100 centimeters (cm)
1 Kilometer (km)	= 1000 meters
1 decimeter (dm)	= 1/10 meter
Measure of Weight	
1 gram (g)	= 1000 milligrams (mg)
1 kilogram (kg)	= 1000 grams
Liquid Measures	
1 liter (L)	= 1000 milliliters (mL)
1 deciliter (dL)	= 1/10 liter

Units

Physics Experiments

Measurements

Unit systems Accuracy

SI Units

- System International

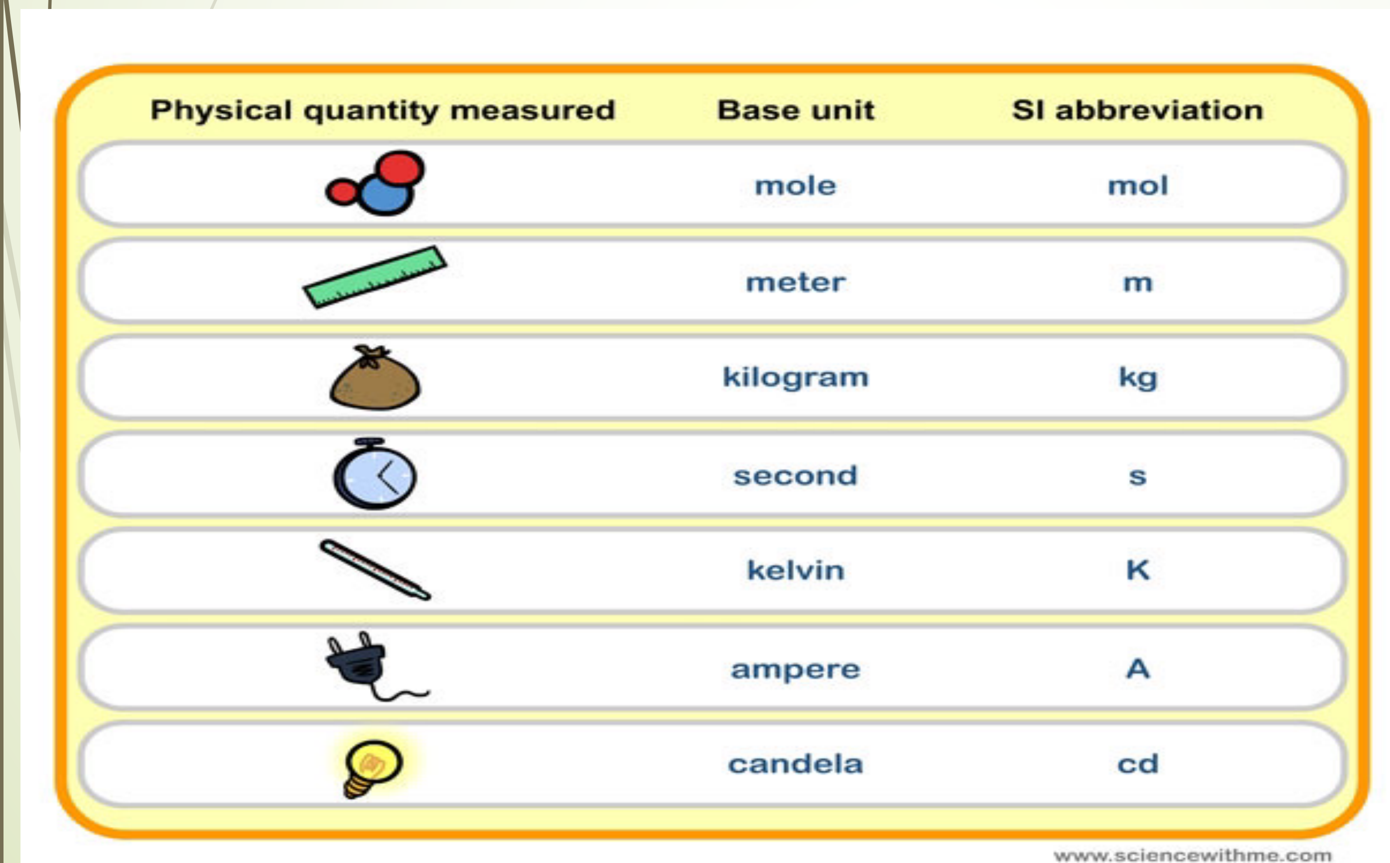
CGS

- Centimeter-gram-second

BE

- British Engineering system

	Length	Mass	Time
SI units	Meter(m)	Kilogram(kg)	Second(s)
CGS units	Centimeter (cm)	Gram(g)	Second(s)
BE	Foot(ft)	Slug(sl)	Second(s)



Physical quantity measured	Base unit	SI abbreviation
	mole	mol
	meter	m
	kilogram	kg
	second	s
	kelvin	K
	ampere	A
	candela	cd

www.sciencewithme.com

Ps:

All other quantities can be derived from the basic units.. Give examples??

TABLE 2–1 The Three Basic Unit Systems

QUANTITY	SI	CGS	BRITISH
Length	meter (m)	centimeter	foot
Time	second (sec)	second	second
Mass	kilogram (kg)	gram	slug
Velocity	m/sec	cm/sec	ft/sec
Acceleration	m/sec^2	cm/sec^2	ft/sec^2
Force	newton ($kg \cdot m/sec^2$)	dyne ($gm \cdot cm/sec^2$)	pound ($slug \cdot ft/sec^2$)
Work, energy	joule ($N \cdot m$)	erg ($dyne \cdot cm$)	$ft \cdot lb$
Power	watt (joule/sec)	erg/sec	$ft \cdot lb/sec$
Torque	$N \cdot m$	$dyne \cdot cm$	$lb \cdot ft$
Pressure	pascal (N/m^2)	$dyne/cm^2$	lb/ft^2

Table of Conversion

CONVERSION TABLE

LINEAR MEASURE CONVERSIONS

1 mm	=	1000 μm
1 m	=	1000 mm
1 km	=	0,621 372 7 miles
1 mil	=	0,025 4 mm
1 mil	=	0,001 inch
1 yard	=	0,914 4 m
1 English foot	=	0,304 8 m
1 Cape foot	=	0,314 858 m
1 inch	=	25,4 mm
1 mile	=	1,609 34 km
1 nautical mile	=	1852 m
1 geographic mile	=	7420 m
1 chain (22 yards)	=	20,110 m
1 Cape road	=	3,778 301 m
1 rod	=	5,029 m
1 furlong	=	201,168 m (40 rods)
1 fathom (6 feet)	=	1,829 m
1 cable's length	=	185,319 m
1 yard	=	3 feet
1 cm	=	10 mm or 0.3937 inch

MASS CONVERSIONS

1 mg	=	0.001 g
1 g	=	0,001 kg or 1 000 mg
1 kg	=	0,001 t (ton)
1 t	=	1000 kg
1 pound (lb)	=	0,453 6 kg
1 ounce (oz)	=	28,350 g
1 short ton	=	907,200 kg
	=	0,907 2 t (metric ton)
1 long ton	=	1 016 kg
	=	1,016 t (metric ton)
1 grain	=	0,064 798 9 g
1 dram (av)	=	1,771 85 g
1 drachm (apoth)	=	3,887 93 g
1 slug (32,174 lb)	=	14,593 9 kg
1 carat	=	200mg or 0,2g

SQUARE MEASURE CONVERSIONS

1 cm^2	=	0,000 1 m^2
	=	0,155 $inch^2$
1 m^2	=	10,760 $feet^2$
	=	1,196 $yards^2$
1 km^2	=	1 000 000 m^2
	=	0,386 104 0 $miles^2$
1 hectare	=	10 000 m^2
1 acre	=	0,404 686 hectare
1 morgen	=	0,856 531 8 hectare
1 $yard^2$	=	0,836 127 m^2
1 $foot^2$	=	0,092 903 m^2
1 Cape $foot^2$	=	0,099 135 623 1 m^2
1 Cape $road^2$	=	14,275 529 73 m^2
1 $inch^2$	=	6,452 cm^2
1 $mile^2$	=	2,589 99 km^2
1 superficial square	=	9,29 m^2
1 $chain^2$	=	404,686 m^2
1 $mile^2$	=	640 acres
1 acre	=	4 046,860 m^2
1 morgen	=	8 565,320 m^2

PRESSURE & STRESS

1 Pa (Pascal)	=	1 N/m^2
	=	0,000 001 N/mm^2
	=	0,000 01 bar
1 lbf / $inch^2$ (psi)	=	6,895 kPa
1 short tonf / $inch^2$	=	13,79 MPa
1 short tonf / ft^2	=	95,76 kPa
1 long tonf / $inch^2$	=	15,44 MPa
1 long tonf / ft^2	=	107,3 kPa
1 bar	=	100 kPa
1 kgf / cm^2 or 1 atm.	=	98 100 Pa
1 torr (1mm Hg,0°C)	=	133 Pa
1 atm. (atmosphere)	=	101 325 N/m^2

TEMPERATURE

n °F	=	0,555 6 (n-32) °C
n °C	=	(1,8n + 32) °F

CUBIC MEASURE CONVERSIONS

1 $yard^3$	=	0,764 6 m^3
1 $foot^3$	=	0,028 32 m^3
	=	28,320 litres
1 $inch^3$	=	16 387 mm^3
	=	0,016 39 litres
	=	16,39 ml
	=	16,39 cm^3
1 gallon (imperial)	=	4,546 dm^3
1 gallon (US)	=	3,785 dm^3
1 m^3	=	1000 litres
1 cm^3 or 1000 mm^3	=	1 ml
1 m^3	=	1 000 000 000 mm^3
	=	1 000 000 cm^3
	=	1 000 dm^3
1 dm^3	=	1 litre
1 gallon (imperial)	=	4,546 litres
1 gallon (US)	=	3,785 litres
1 litre	=	0,219 973 gallon (imp.)
	=	0,264 200 gallon (US)
1 pint	=	0,568 litres

VELOSITY (LINEAR)

1 m/s	=	1000 mm/s
1 ft/s	=	0,304 8 m/s
1 mile/h	=	1,609 km/h
1 km/h	=	0,621 372 miles / hour
1 knot	=	1 nautical mile/hour
	=	1,852 km/h
	=	0,514 445 m/s
1 km/h	=	0,539 956 knot

FORCE CONVERSIONS

1 N (newton)	=	1 $kg.m.s^{-2}$
1 kN	=	1000 N
1 lbf	=	4,448 N
1 short ton force	=	8,896 kN (8896 N)
1 long ton force	=	9,964 kN (9964 N)
1 poundal	=	0,138 255 N

Table of Conversion

LENGTH

Ordinary Units

1	foot	= 12 inches
1	yard	= 3 feet
1	mile	= 5280 feet
1	nautical mi	= 1.1516 statute mi
1°	of latitude at the equator	= 69.16 statute mi
		= 60 nautical mi
1	acre	= 208.71 ft on one side of square

Metric Units

1000	picometres	= 1 nanometre
1000	nanometres	= 1 micrometre
1000	micrometres	= 1 millimetre
10	millimetres	= 1 centimetre
100	millimetres	= 1 decimetre
10	centimetre	= 1 decimetre
1000	metres	= 1 netre
100	centimetres	= 1 metre
10	decimetres	= 1 metre
100	metres	= 1 hectometre
1000	metres	= 1 kilometre
10	hectometres	= 1 kilometre
1000	kilometres	= 1 megametre
1852	nautical metres	= 1 international nautical mile

Equivalents

1	inch	= 2.5400 centimetres
1	foot	= 0.3048 metre
1	statute mi	= 1.60935 kilometres
1	nautical mi	= 1.853 kilometres
1	centimetre	= 0.39370 inch
1	metre	= 3.28 feet
1	kilometre	= 3280.83 feet
		= 0.62137 mile

AREA

Ordinary Units

1	square foot	= 144 square inches
1	square yard	= 9 sq ft
		= 1296 sq ft in.
1	acre	= 43,560 sq ft
		= 4840 sq yds
1	sq mile	= 640 acres
		= 1 section of land (U.S.)

Metric Units

100	sq millimetres	= 1 sq centimetre
100	sq centimetres	= 1 sq decimetre
10000	sq centimetres	= 1 sq metre
100	sq decimetres	= 1 sq metre
100	sq metres	= 1 are
10	ares	= 1 dekare
10000	sq metres	= 1 sq hectometre
		= 1 hectare
100	ares	= 1 hectare
10	dekares	= 1 hectare
100	sq hectometres	= 1 sq kilometre
100	hectares	= 1 sq kilometre

Equivalents

1	square centimetre	= 0.155 square inch
1	square metre	= 10.76 square feet
		= 1.196 square yards
1	square kilometre	= 0.386 square mile
1	square inch	= 6.45 square centimetres
1	square foot	= 0.0929 square metre
1	square yard	= 0.836 square metre
1	square mile	= 2.59 square kilometres

VOLUME AND CAPACITY

Ordinary Units

1 cu ft of water at 39.1° F	= 62.425 lbs
1 United States gallon	= 231 cu in.
1 imperial gallon	= 277.274 cu in.
1 cubic foot of water	= 1728 cu in.
	= 7.480519 U. S. gallons
	= 6.232103 imperial gallons
1 cubic yard	= 27 cu ft
	= 46,656 cu in.
1 quart	= 2 pints
1 gallon	= 4 quarts
1 U. S. gallon	= 231 cu in.
	= 0.133681 cu ft
	= 0.83311, imperial gallon
	= 8.345 lbs
1 barrel	= 31.5 gallons
	= 4.21 cu ft
1 U. S. bushel	= 1.2445 cu ft
1 fluid ounce	= 1.8047 cu in.
1 acre foot	= 43,560 cu ft
	= 1,613.3 cu yds
1 acre inch	= 3,630 cu ft
1 million U. S. gallons	= 133,681 cu ft
	= 3.0689 acre-ft
1 ft depth on 1 sq mi	= 27,878, 400 cu ft
	= 640 acre-ft

Metric Units

1000	cu millimetres	= 1 cu centimetre
1000	cu centimetres	= 1 cu decimetre
1000	cu decimetres	= 1 cu metre
1000	cu metres	= 1 cu dekametre
1000	dekametres	= 1 hectometre
1000	cu hectometres	= 1 cu kilometre
1000	microlitres	= 1 millilitre
		= 1 cu centimetre
10	millilitres	= 1 centilitre
10	centilitres	= 1 decilitre
1000	millilitres	= 1 litre
100	centilitres	= 1 litre
100	litres	= 1 hectolitre
1000	litres	= 1 kilolitre
		= 1 cu metre
10	hectolitres	= 1 kilolitre

Equivalents

1	cu in.	= 16.387 cu cm
1	cu ft	= 0.0283 cu m
1	cu yd	= 0.765 cu m
1	cu cm	= 0.0610 cu in.
1	cu m	= 35.3 cu ft
		= 1.308 cu yds
1	litre	= 61.023378 cu in. (about 1 quart)
		= 0.264170 U. S. liquid gallon
		= 0.2201 imperial gallon
1	U. S. liquid quart	= 0.946 litre
1	U. S. liquid gallon	= 3.785 litres

WEIGHT (MASS)

Ordinary Units

1 pound	= 16 ounces (avoirdupois)
1 ton	= 2000 lbs
1 long ton	= 2240 lbs
1 lb of water (39.1° F)	= 27.681217 cu in.
	= 0.016019 cu ft
	= 0.119832 U. S. gallon
	= 0.453617 liter

Equivalents

1 kilogram	= 2.205 avoirdupois pounds
1 metric ton	= 0.984 gross or long ton
	= 1.102 net or short tons
1 avoirdupois pound	= 28.35 grams
1 avoirdupois	= 0.4536 kilogram

To Covert	Multiply by
ounces into grams	28.3495
pounds into grams	453.6
pounds into kilograms	0.4536
tons into kilograms	1016.047
tahils into grams	37.799
kati into kilograms	0.60479
grains into grams	0.0648

To Covert	Multiply by
grams into ounces	0.03527
grams into grains	15.4324
grams into tahil	0.02646
kilograms into pounds	2.2046
kilograms into tons	0.0009842
kilograms into katis	1.653
kilograms into stones	0.1575
kilograms into hundreweights	0.01968

NON-METRIC TO METRIC LINEAR

To Covert	Multiply by
inches into centimetres	2.540
inches into metres	2,540 x 10^{2}
inches into millimetres	25.4
feet into metres	0.3048
yards into metres	0.9144
miles into kilometres	1.609344
miles into metres	1609.344
feet into centimetres	30.48

METRIC TO NON-METRIC LINEAR

To Covert	Multiply by
millimetres into feet	3.281 x 10^{3}
millimetres into inches	0.03937
centimetres into inches	0.3937
metres into feet	3.281
metres into yards	1.09361
kilometres into yards	1093.61
kilometres into miles	0.62137

VELOCITY

To Covert	Multiply by
miles per hour into kolometres per hour	1.609344
feet per second into metres per second	0.3048
feet per second into centimetres per second	30.48
centimetres per second into feet per second	0.03281
metres per second into feet per minute	196.9
metres per second into feet per second	3.281
kilometres per hour into miles per hour	0.6214

The Conversion of Units

- Using the table of conversion,
- answer these questions.

Q1 Convert 12 inches to centimeters.

Ans.1: From the table: 1 inch = 2.54 cm

Form a ratio of value 1: $\frac{1\,\text{inch}}{2.54\,\text{cm}} = 1$, $\frac{2.54\ \text{cm}}{1\,\text{inch}} = 1$

(12 inches)x $\left(\frac{2.54\ \text{cm}}{1\,\text{inch}}\right)$ = 30.5 cm

Base quantities and units

- The system international has seven base quantities and units

Base Quantity		Base unit	
Name	Symbol	Name	Symbol
time	t	second	s
length	l	meter	m
mass	m	kilogram	kg
temperature	T,ɵ	kelvin	K
Electric current	I	ampere	A
Amount of substance	n	mole	mol
Luminous intensity		candela	cd

Some common Derived Quantities and their units:

Physical quantity	Defined as	unit	Special name
density	Mass ÷ volume	$kg/\ m^3$	
momentum	Mass x velocity	kg m/s	
force	Mass x acceleration	$kg\ m/s^2$	newton
pressure	Force ÷Area	kg/ms^2	pascal
Work(energy)	Force x distance	$kg\ m^2/s^2$	joule
power	Work ÷ time	$kg\ m^2/s^3$	watt
Electric charge	Current x time	As	coulomb
Velocity	distance÷time	m/s	
acceleration	velocity÷time	m/s	

Difference between base and derived quantities

Base quantities

- They do not depend on any quantities
- They are seven in number
- Examples :length , mass, time etc
- Their units are called as base units

Derived quantities

- They depend on base quantities

They are many

Examples : force, velocity, acceleration etc

Their units are called as derived units they are derived from base units

Homogeneous equations

- This means that in any correct equation the base units of each part must be the same
- The base units on the right hand side of the equation should be the same as left hand side

Example

- Kinetic energy = $1/2\ mv^2$
- Joule = $1/2\ kg\ m^2/s^2$
- $kg\ m^2/s^2$ = $kg\ m^2/s^2$
- ½ is a pure number and has no units.

To check an equation we can make use of units.

Prefixes

- For very large or small numbers, we can use standard prefixes

prefix	symbol	multiplier
giga	G	10^9
mega	M	10^6
kilo	k	10^3
milli	m	10^{-3}
micro	μ	10^{-6}
nano	n	10^{-9}
pico	p	10^{-12}
femto	f	10^{-15}

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Significant figures

- To find the number of significant figures you must count up the total number of digits, starting at the first non-zero digit , reading from left to right

3 s.f	2 s.f	1 s.f
4.62	4.6	5
0.00501	0.0050	0.005
3.40×10^6	3.4×10^6	3×10^6
169	1.7×10^2	2×10^2

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Example of significant figures

A man covers a distance of 100.0m in 68s.Calculate his average speed.

Speed = distance/time

= 100.0/68

= 1.4705882 m/s

This is the answer from your calculator

Distance:4 s.f., time:2 s.f. See the smaller one.

We round to 2 s.f.

So our answer will be = 1.5m/s

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Vectors and Scalars

- Vectors have both magnitude and direction.
- Scalars have only magnitude but no direction

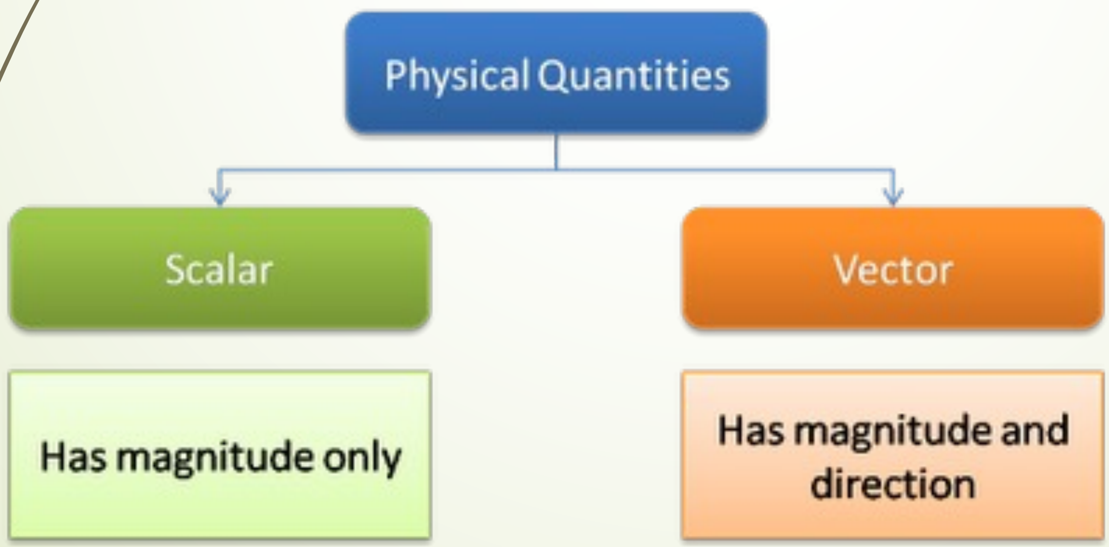
Scalars	Vectors
Distance	Displacement
Speed	Velocity
Mass	Weight
Pressure	Force
Energy	Momentum
Temperature	Acceleration
Volume	Electric current
Density	Torque

Scalars and Vectors

A **scalar quantity** is one that can be described with a single number (including any units) giving its size or magnitude.

A **vector quantity** is one that deals inherently with both magnitude and direction.

Ps: arrows are used to present the direction of the vector, and the length of the arrow represents the magnitude.



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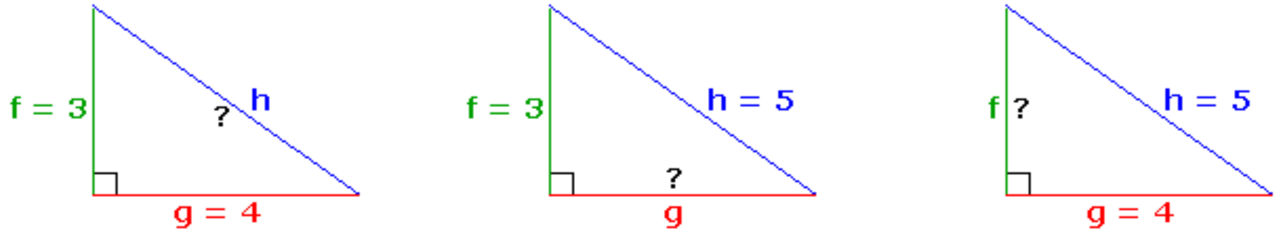
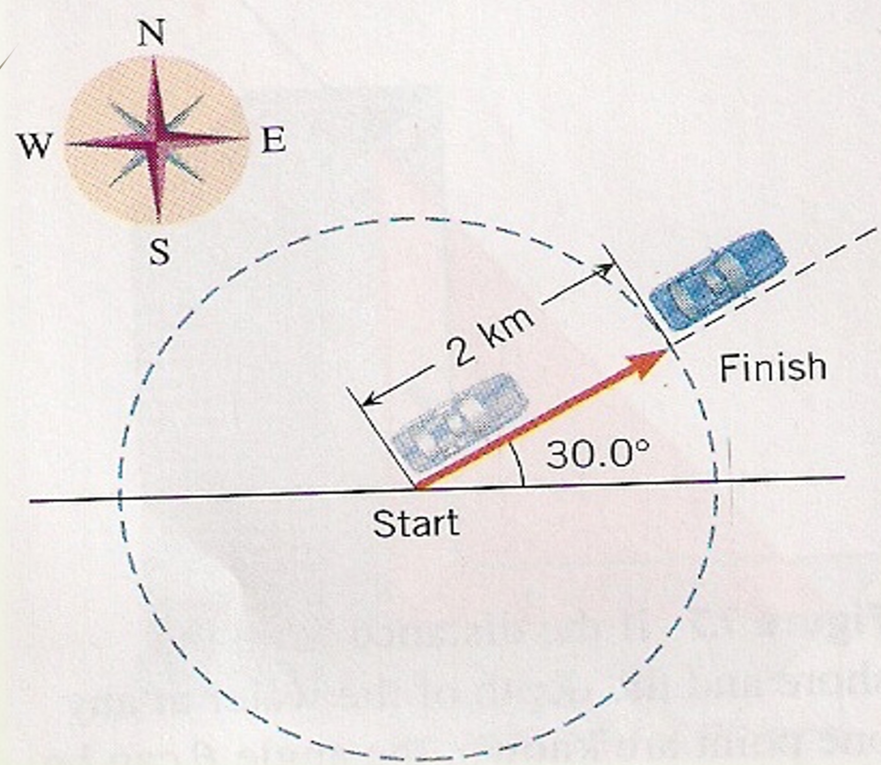


$$h^2 = f^2 + g^2$$
$$h^2 = (3)^2 + (4)^2$$
$$h^2 = 9 + 16$$
$$h^2 = 25$$
$$h = 5$$

$$h^2 = f^2 + g^2$$
$$g^2 = h^2 - f^2$$
$$g^2 = (5)^2 - (3)^2$$
$$g^2 = 25 - 9$$
$$g^2 = 16$$
$$g = 4$$

$$h^2 = f^2 + g^2$$
$$f^2 = h^2 - g^2$$
$$f^2 = (5)^2 - (4)^2$$
$$f^2 = 25 - 16$$
$$f^2 = 9$$
$$f = 3$$

SCALARS AND VECTORS



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Representing Vectors

- Vectors can be represented by arrows

A horizontal force of 20N:

A vertical force of 10N:

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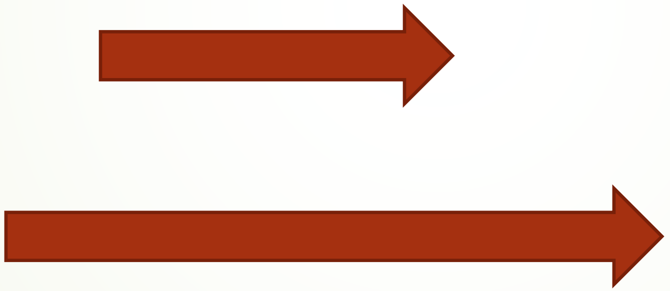
Scalar and Vector Addition

Scalars are simply added together

Vectors acting along the same straight line:

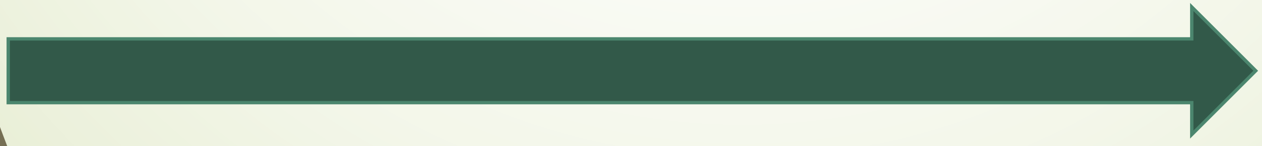
F1

F2



Resultant

F1+F2



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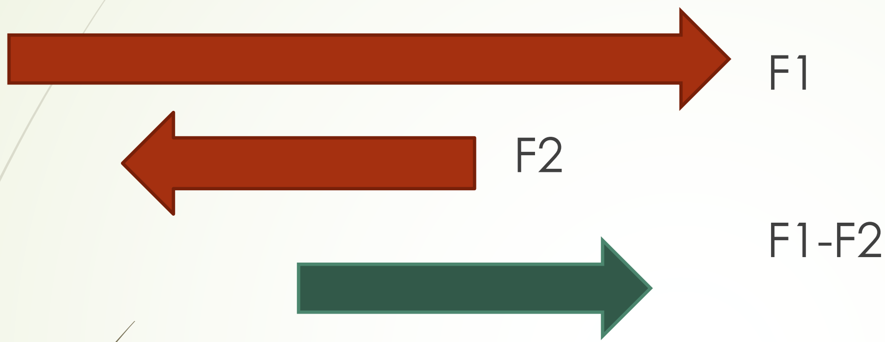
Vectors acting in the opposite direction



Resultant

The length of the arrow represents the magnitude of the vector

The direction of the arrow represents the direction of the vector.

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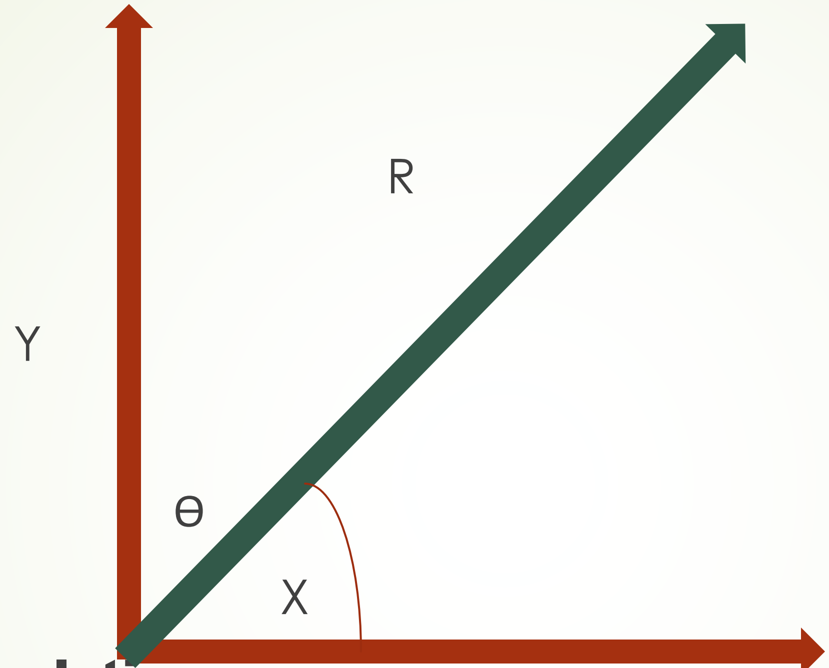
Perpendicular Vectors



1.By Calculation

The magnitude of the Resultant vector R can be

Found using Pythagoras theorem: $R^2 = X^2 + Y^2$

$\tan\theta$ = opposite/adjacent = Y/X

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Trigonometry

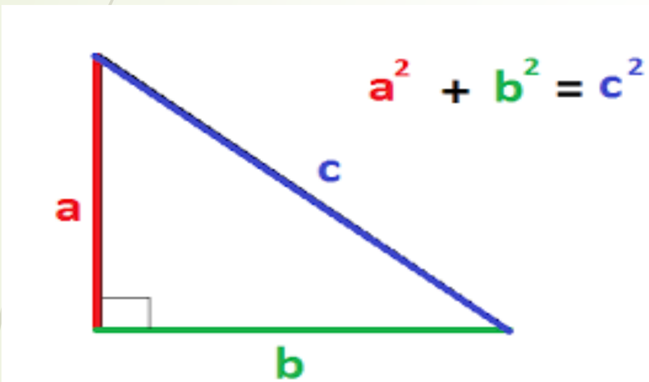
DEFINITION OF SIN θ, COS θ, AND TAN θ

$$\sin\theta = \frac{h_o}{h} \quad (1.1)$$

$$\cos\theta = \frac{h_a}{h} \quad (1.2)$$

$$\tan\theta = \frac{h_o}{h_a} \quad (1.3)$$

h = length of the **hypotenuse** of a right triangle
h_o = length of the side **opposite** the angle θ
h_a = length of the side **adjacent** to the angle θ



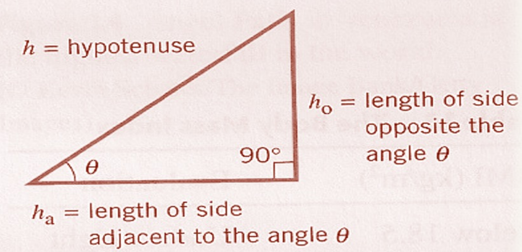


Figure 1.5 A right triangle.

Pythagorean Theorem

The square of the length of the hypotenuse of a right triangle is equal to the sum
Of the squares of the lengths of the other two sides:

$$h^2 = h_o^2 + h_a^2$$

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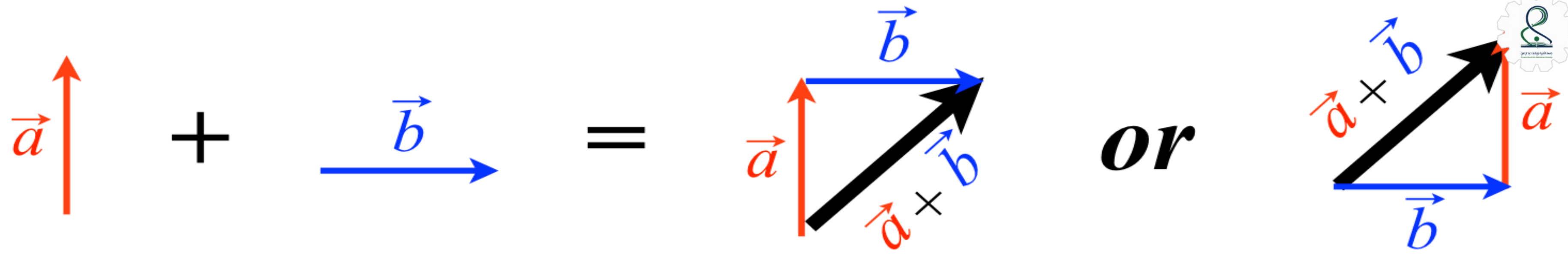

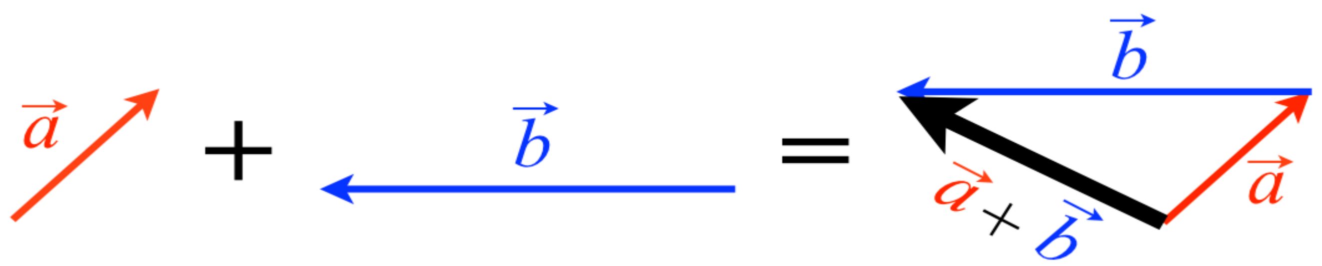

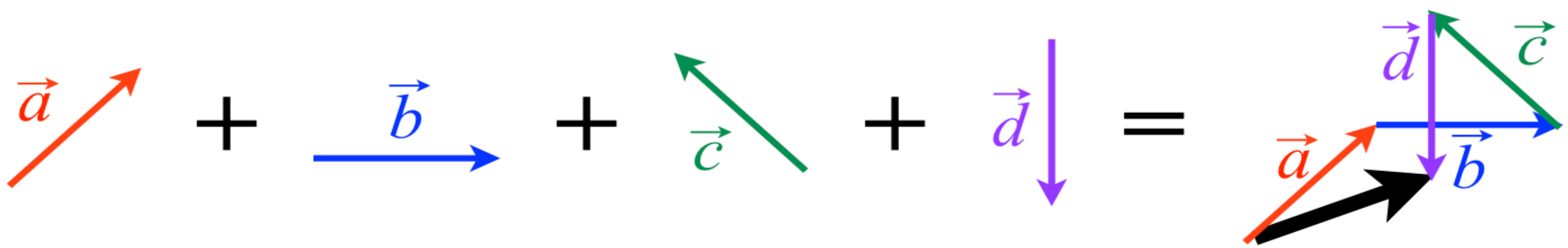

Trigonometry

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example

1. If the car moves 40 m to east then 30 m to north find the magnitude of the Resultant vector and direction

2. Find the length of hypotenuse if the length of legs are 5 and 12

Trigonometry

EXAMPLE

Example 1

Find the length of the hypotenuse if the lengths of the legs are 5 and 12.

$$c^2 = a^2 + b^2$$

$$(hypotenuse)^2 = (leg)^2 + (leg)^2$$

$$x^2 = 5^2 + 12^2$$

$$x^2 = 25 + 144$$

$$x^2 = 169$$

$$x = \sqrt{169}$$

$$x = 13$$

Geometry EETT Grant

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Trigonometry

EXAMPLE

$$R = \sqrt{A^2 + B^2}$$
$$= \sqrt{40^2 + 30^2}$$
$$= \sqrt{2500}$$
$$= 50 \text{ m}$$

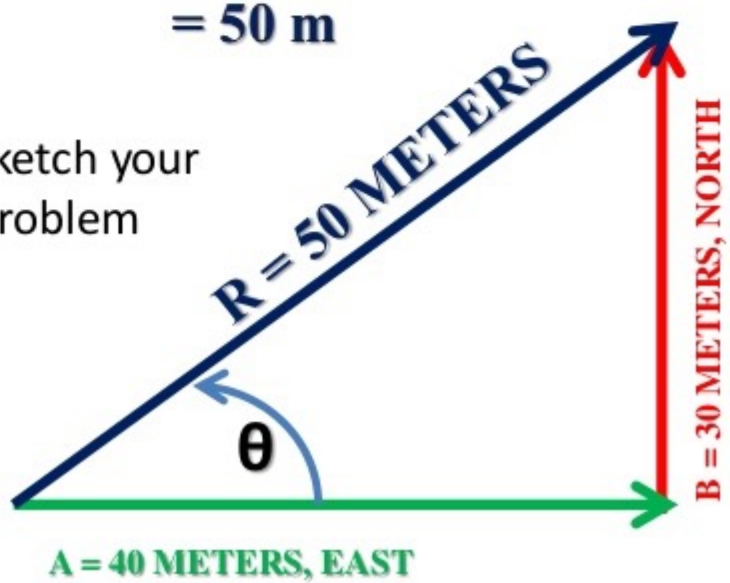
$$\theta = tan^{-1}\frac{opp}{adj}$$

$$\theta = tan^{-1}\frac{30}{40}$$

use calculator

$$\theta = 36.87° \; N \; of \; E$$

sketch your problem



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Dimensional Analysis

- The dimensional analysis is important in checking the validity of any mathematical expression. The dimension of any quantity will be defined in brackets [ ]. The dimension of velocity v is $[v]$ = L/T
- Example:

is the expression of $x = 1/2\, at^2$ is correct dimensionally

$$L = \frac{L}{T^2} \times T^2 = L$$

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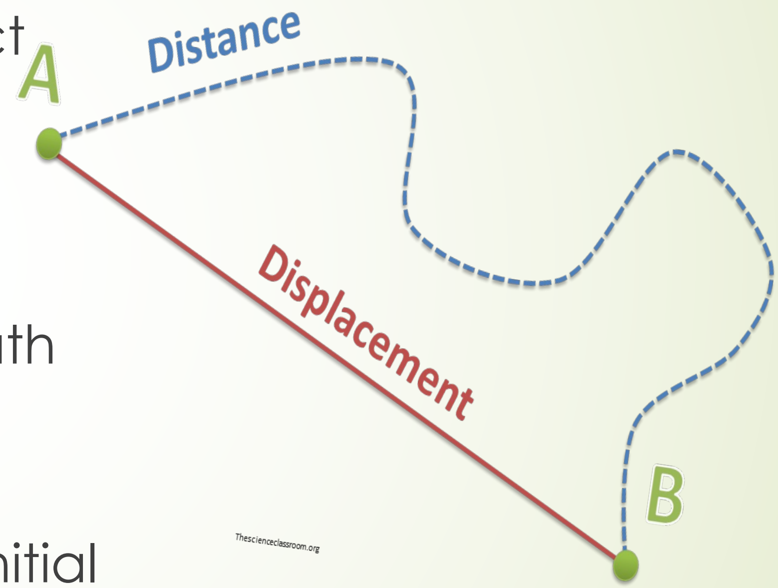
Motion In One Dimension

PHYS 102

Distance and Displacement

- Distance and Displacement are both ways of measuring how far an object has moved.
- Distance is a scalar quantity and Displacement is a vector quantity.
- Distance is the total length of the path travelled.
- Displacement is the length of the shortest straight path between the initial and final point in a particular direction.
- Both are measured in meters.



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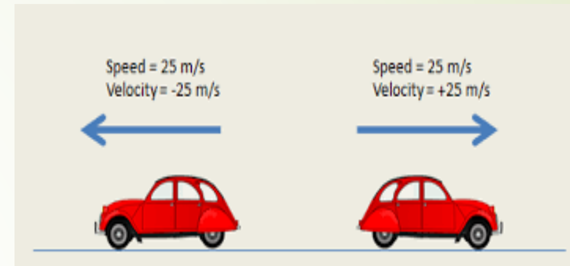
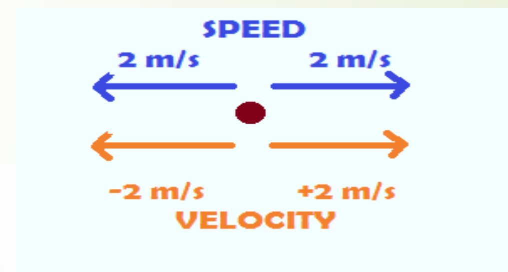
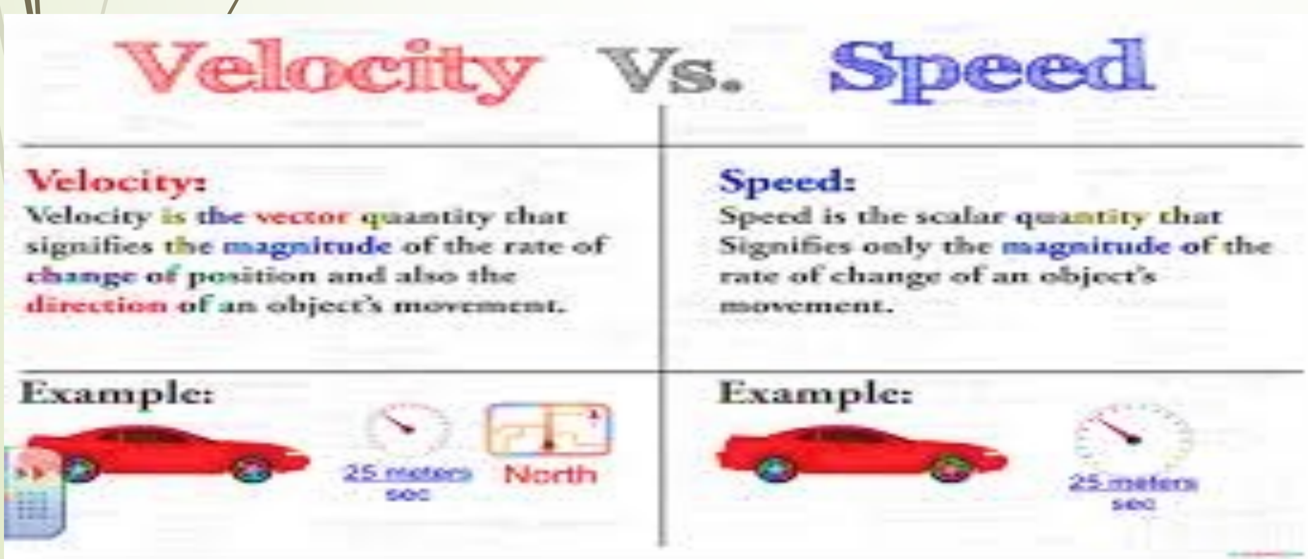
Speed and Velocity

- The speed of an object is the distance moved per second.(or the rate of change of distance is speed).
- Average speed = distance/time m/s (1)
- Speed is a scalar quantity but Velocity is a vector.
- Velocity is the rate of change of displacement.
- Average velocity = displacement/time m/s (2)







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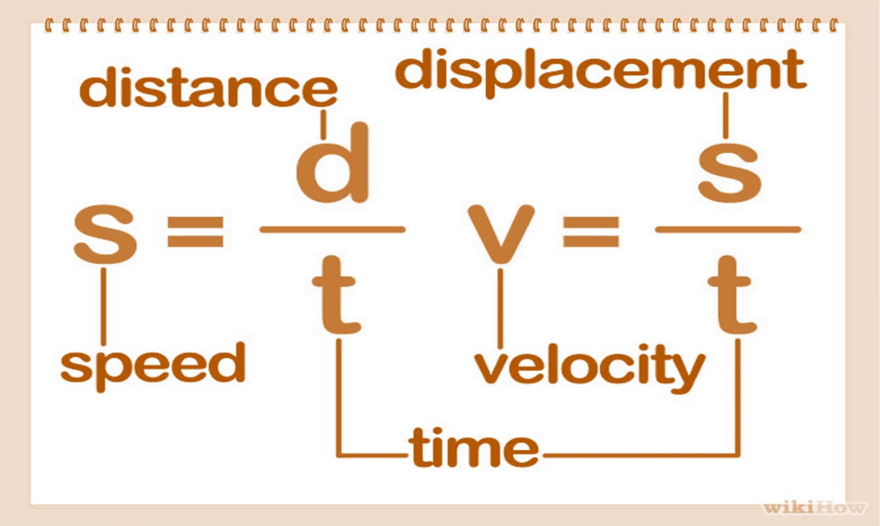
Instantaneous Velocity

- Using equations 1&2 you can find the average speed and average velocity for a car journey.
- A speedometer shows the actual or instantaneous speed of the car , which varies through out the journey.
- To find the instantaneous speed or velocity you have to find the distance moved or the displacement , over a very small interval of time
- The smaller the time ,the closer we get to an instantaneous value.



PHY S 102

Acceleration

- Acceleration is the rate of change of velocity.
- Acceleration = change in velocity/time m/s^2
- It is a vector quantity .
- The change in velocity may be change in speed or direction or both.
- If an object is slowing down , its change in velocity is negative ,this means a negative acceleration or deceleration.

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

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Equations of motion

- When an object moves with constant , uniform acceleration in a straight line,we can use the following 4 equations :
- 1) $v = u + at$ — u = initial velocity
- 2) $s = \frac{1}{2}(u + v)t$ — s = displacement
- 3) $s = ut + \frac{1}{2}at^2$ — v = final velocity
- 4) $v^2 = u^2 + 2as$ — a =constant acceleration

t = time

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HOMEWORK

PHYS 101

Lecture 1 Homework

1. With an average acceleration of -1.2 m/s^2, how long will it take a cyclist to bring a bicycle with an initial speed of 6.5 m/s to a complete stop?

2. Suppose a treadmill has an average acceleration of $4.7 \times 10^{-3} m/s2$.

   a. How much does its speed change after 5.0 min?

   b. If the treadmill's initial speed is 1.7 m/s, what will its final speed be?

3. The radius of the planet Saturn is 5.85 X10 7 m , and its mass is 5.68 X 10^{26} kg .Find its density and find the surface area.

HOMEWORK

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Lecture 1 Homework

4. Consider a car that starts at rest and accelerates at $2 m/s^2$ for 3 seconds.

    At that time, t = 3 s, how fast is it going? and how far has it gone?

5. A car accelerates in a straight line from rest of 2.3 m/s^2.a)What is the speed of the car after it has travelled 55m?b)How long does it take the car to travel 55m?

6. Check if this equation is dimensionally correct: $T = 2\pi\sqrt{L/g}$ .where T is period, L is length, g is acceleration.

HOMEWORK

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Lecture 1 Homework

5) Convert the following:

50µm =………m

1.5X 1011m =……..km .Write using prefix =

……….

1.440 X106 g =……..kg

10nm = ……m =…..mm =…….. µm

1 µs = …….s

6) Write the unit described by the following combinations of units:

kg (m/s) (1/s) = ……….

(kg/s) (m/s_2) = ………

(kg/s)$(m/s)_2$ = …… ….

(kg/s)(m/s) = ………

7) Do these calculations and use proper significant figures:

26 X 0.02584 =

15.3 +1.1 =

782.45 X 3.5 =

63.258 + 734.2 =

HOMEWORK

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Fill in the blanks:

- 1) Velocity is the rate of change of ………..It is measured in ………..
- 2) A change in velocity can be a change in…….,or ……. ,or both.
- 3) Acceleration is a …….. Quantity. It is measured in ……….

PHYS 102

Physics is Awesome
☺

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