

Physics: concerned with description and understanding of natural through measurements. • NOT
 E r measurements are expressed in units. r some units referenced to human body. r standard unit:
 officially accepted. r system of units: agroup of standard units and their combination. ~ two major
 systems of units metric system British system «Engineering» r it always possible to convert From one o n
 e u n i t t o another. r Different units in the same system or units o f Different system c a n be used to
 describe same thing 1.2 SI Units of Length, Mass, and Time 2 LEARNING PATH QUESTIONS – What is
 the difference between base and derived units? – How are the meter (m), the kilogram (kg), and the
 second (s) currently defined? • length, mass, time fundamental quantity mechanics require only these
 quantity • Length base quantity v u s e d t o m e a s u r e D i s t a n c e or Dimensions. i s s p a c e . r s l u
 n i t of length is meter. • meter originally: 1/10000000 Distance from North pole t o equator. • meter
 originally: t h e Distance between t w o marks on metal bar a platinum–iridium" • m e t e r currently: path
 traveled by light in vacuum during 1/(speed) second. length standard referenced to time. LENGTH:
 METER North Pole 3 1 m 1 m = distance traveled by light in a vacuum in 1/299 792 458 s
 a m a s s b a s e quantity 1330° 345° Barcelona 10 00 000 m5. 60° 30° ° 5 1 Equator (a) u s e d to
 describe amount o f matter l the more massive object m o r e m a t t e r i s c o n t a i n . S I unit of mass
 kilogram. • Kilogram originally: c u b e o f w a t e r 10 cm s i d e . • Kilogram currently: – mass of
 cylinder a platinum–iridium" ~ mass referenced to specific material s t a n d a r d . NOTE ~ in SI mass is
 base quantity v i n British weight is base quantity ~ Base quantities remain same 4 • t i m e o the forward
 flow of events. ~ T i m e i s f o u r Dimension. l S I u n i t o f time s e c o n d • second originally: Define by
 solar c l o c k a l d a y = 2 4 4 = 1 4 4 0 0 = 8 6 4 0 0 5 ☞ • second currently: Define by "atomic clock" " c
 e s i u m – 1 3 3 n One frequency oscillation Cesium–133 1 s = 9 192 631 770 oscillations (a) 1 R a d i a
 t i o n detector • application length and time " G P S " position a n d location on earth. 5 • u n i t s •
 Base 7 u n i t s • Defined by S t a n d a r d TABLE 1.1 The Seven Base Units of the SI • Derived 1 c o
 m b i n a t i o n o f b a s e units. Name of Unit (abbreviation) Property Measured meter (m) length
 kilogram (kg) mass second (s) time ampere (A) electric current kelvin (K) temperature mole (mol)
 amount of substance candela (cd) luminous intensity N e w t o n J o u l pascal W a t t DID YOU L E A R
 N ? – Base units are defined by standards. Derived units are combinations of base units. ☞ The meter is
 defined in terms of the speed of light, the standard mass of 1 kg is associated with a platinum–iridium
 cylinder, (the only SI standard unit referenced to a material artifact), and the second is defined by the
 radiation frequency