Physics: concerned with description and understanding of natural through m e a s u r m e n t s. • N O T E r measurments are expressed in units. r some units referenced t o human body. r standard unit: officially accepted. r system of units: agroub of standard units and their combination. ~ two major systems of units metric system British system «Enginerring) 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? • lengtt, mass, time fundamental guntity mechanics require only these gustity • Length base guntity v u s e d t o m e a s u r e D i s t a n c e or Dimensions. is s p a c e . r s l u n it 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-iridum" • m e t e r currently: path traueled by light in vacum during 1/(speed) second. length standard referenced to time. LENGTH: Dunkit 3 •1 m 1 m = distance traveled by light in a vacuum in 1/299 792 458 s كوا الا METER North Pole a m a s s b a s e guntity 1330°)345° Barcelona 10 00 000 m5. 60° 30° ° 5 1 Equator (a) u s e d to describe amount of matter I the more massive object m or e m at ter is c on tain. 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-ividum" ~ mass referenced to specific material s t a n d a r d . NOTE ~ in SI mass is base guntity v i n British weight is base gunity ~ Base guntities remain same 4 • t i m e o the forward flow of events. ~ Ti m e is four Dimension. I S I u n i t o f time s e c o n d • second originally: Define by solar c I o c k a I d a y = 2 4 4 = 1 4 4 0 0 = 8 6 4 0 0 5 f • second currently: Define by "atomic clock" " c R a d i a d t i o n detector • application length and time "GPS" 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 I 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. I 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