King Abdulaziz University

Physics Department

Course of Physics 110 in the Second

Semester of 1430 H

Solving Problems

Solving Problems from Chapter 1

Changing Units

(Q1-1) How many microns make up 1 Km?

Answers of (Q1):

1 μ m = $1x10^{-6}$ m

1km = 10^{3}

$$1km = \frac{1\ \mu\ m\ x10^{3}m}{1x10^{-6}m} = 10^{9}\mu\ m$$

(Q1-2) What fraction of a centimetre equals 1.0 µ m?

Answer of (Q2) is:

fraction of 1cm = $1x10^{-2}$ m

1µm = $1x10^{-6}$ m

Therefore

$$\text{fraction 1cm} = \frac{1x10^{-2}m}{1x10^{-6}\,m} = 10^{+4}\,\mu m$$

(Q1-3) How many micron in 1 Yd if 1 inch= 2.54 cm

An answer of (Q3) is:

1 inch = 2.54 cm

∵ 1ft = 12 inch

∴ 1Yd = 3fts = 3x 12 inch

And

∴ 1Yd = 36 inches = 36 x 2.54 cm

= 91.44cm=91.44/100 = 0.9144 m

= $0.9144x\ 10^{6}$ µm= $9.144\ 10^{5}$ µm

Q(1-4) The SI standard of length is based on:

a. wavelength of light emitted by Hg^{189}
b. wavelength of light emitted by Kr^{86}
c. A precision meter stick in Paris
d. The speed of light

Q(1-5) Which of the following is closest to a yard in length?

a. 0.01m
b. 0.1 m
c. 1m
d. 100 m

Q(1-5) $(5.0 \times 10^{4}) \times (3.0 \times 10^{6})$ equal to:

a. 1.5×10^{9}
b. 1.5×10^{10}
c. 1.5×10^{11}
d. 1.5×10^{12}

Q(1-6) A sphere with a radius of 1.7 cm has a volume of:

a. $2.1 \times 10^{-5} m^3$
b. $9.1 \times 10^{-4} m^3$
c. $3.6 \times 10^{-3} m^3$
d. $5.2\ m^3$

Q(1-7) A sphere with a radius of 1.7 cm has an area of:

a. $2.1 \times 10^{-5} m^2$
b. $9.1 \times 10^{-4} m^2$
c. $3.6 \times 10^{-3} m^2$
d. $5.2\ m^2$

Solving Problems from Chapter 2

Straight Line Motion:

Q2-1 (a) if the partical started to move on X axis from point equal to 5m to the point equal 12m what is the magnitude and direction of the displacement (Δ x)?

(b) if started to move from X_1= 5m toward X_2= 1m what is the magnitude and direction of the displacement (Δ x)?

Answer of (a) is:

The displacement (Δ x) = $x_2 - x_1$= 12 - 5= +7m

The magnitude is 7 m and +ve result indicates that the motion is in the +ve direction.

Answer of (b) is:

When the practical moves from x_1= 5 m to x_2= 1 m

Then Δ x = $x_2 - x_1$= 5-1= -4m

The negative result (–ve) indicates that the motion is in the negative direction as shown in this Figure (1-2).

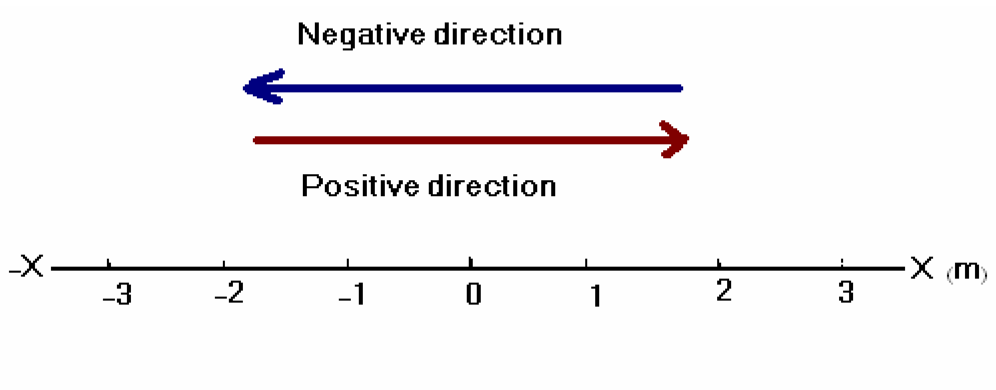
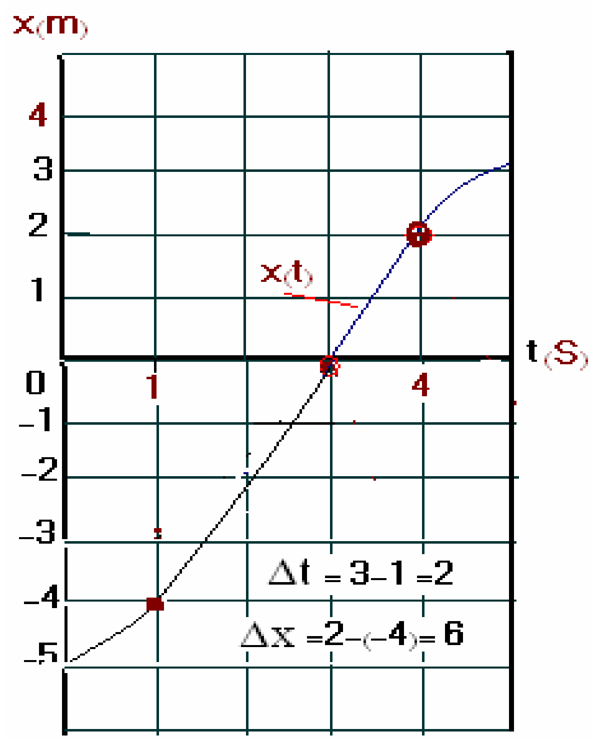


Figure (2-1)

(Q2-2) What is the average velocity V_{ave} from the graph that drawing between the position x (meter) and the time t (second)



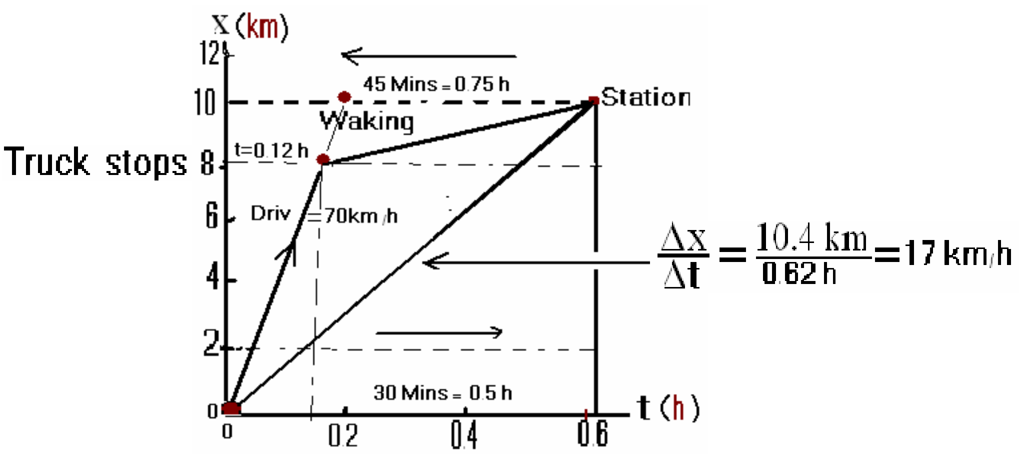
Answer of (Q2-2) is:

The average velocity has the same sign as the displacement because it has the same direction

$$V_{avg} = \frac{\Delta\chi}{\Delta t} = \frac{6}{2} = 3m/s$$

(Q2-3) You drive a beat – up pacing-up truck along a straight rode for 8.4 km at 70 km /h, at which point the truck runs of gasoline and stops. Over a next 30 min, you walk an-other 2 km farther along the rode to gasoline station. (a)What is your overall displacement from the beginning over your drive to your arrival at the station?

The answer (a) is:



X_1=0, X_2 = 8.4,

Therefore, Δx = 8.4- 0= 8.4 km

Δx to station =8.4+ 2= 10.4 km

(Q2-2b) What is the time interval Δt from the beginning of your drive to your arrival at the station

Answer (2b) is:

70km /h = 8.4 km/Δt =0.12 h, The time interval to the station is Δt = 0.12 + 0.50 = 0.62 h

(Q2-3) The position of an x axis is given by:

$$X = 7.8 + 9.2\,t - 2.1\,t^3,$$

when x in meter and time in second, what is the velocity At t= 3.5 s? (a) Is velocity constant or is it continuously changing?

The Answer is:

Firstly the Velocity V is

$$V = \frac{dX}{dt}$$ **and the unit of V is m/s**

And $X = 7.8 + 9.2\,t - 2.1\,t^3$

Note at the time t = 3.5 s V is:

$$\frac{dX}{dt} = \frac{d(7.8 + 9.2t - 2.1t^3)}{dt} = 9.2 - 6.3(3.5)2 = -68 m/s$$

We already substitute by t = 3.5 s after differentiation

The velocity depends on t, and so is continuously changing.

Acceleration

(Q2-4) A particle's position on x axis in fig 2-1 is given by $X = 4 - 27\,t + t3$, (a) what is the acceleration a

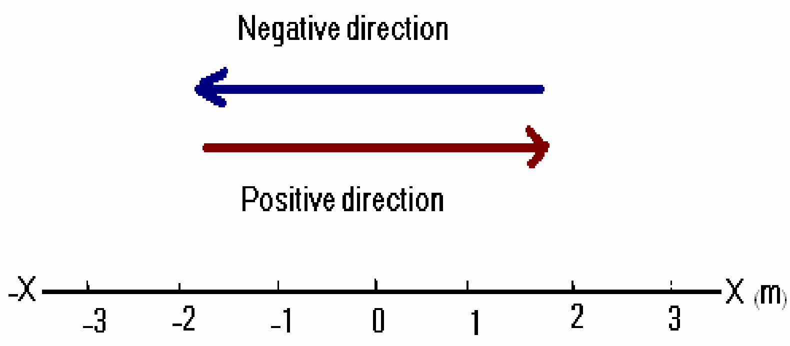


Figure (2-1)

Answer (a) is:

$$V = \frac{dx}{dt} = \frac{d}{dt}(4 - 27\,t + t^3) = -27 + 3\,t^2 ,$$

So,

$$V = (27 + 3\,t^2)$$

Therefor:

$$a = \frac{dv}{dt} = \frac{d}{dt}(27 + 3\,t^2) = 6\,t$$

(Q2-4b) is there ever a time when v = 0?

Answer (b) is:

v = -27+ 3 t2

0 = -27+ 3 t2

So, 3t2= 27 and,

$$t^2 = \frac{27}{3} = 9$$

$$t = \pm 3 \; s$$

Thus the velocity is zero both 3s before and 3s after the clock reads 0.
