CW
25.6.21

Exercise

A. 1. a) Two trains going in opposite directions with the same speed are at rest relative to each other. False

b) A ball is thrown vertically upwards. Its motion is uniform throughout. False

c) The motion of a train starting from one station and reaching at another station is non-uniform. True

d) A motion ~~of a train starting from one~~ which repeats itself after a fixed interval of time is called periodic motion. True

e) A ball thrown by a boy from a roof top has ~~oscillatory motion~~ oscillatory motion. False

f) Mass has both magnitude and direction. False

g) Weight always acts vertically downwards. True

h) Mass varies from place to place but weight does not. False

2. a) Two boys cycling on the road with same speed are at rest relative to each other.

b) The motion in a straight line is rectilinear motion.

c) One to and fro of a clock pendulum takes time = 2 sec.

d) 36 km h^{-1} = 10 ms^{-1}

e) Total distance travelled = average speed × total time taken.

f) The weight of a girl is 36 kgf her mass will be 36 kg.

g) The weight of a body is measured using a spring balance.

3.

Column A	Column B
a) Circular motion -	iii) Movement of the hands of a clock
b) ~~Periodic m~~	
b) Periodic motion -	i) Motion of a pendulum clock
c) Vibratory motion -	iv) Motion of wire of a guitar
d) Rotatory motion -	i) a running fan.
e) Non uniform motion -	~~v) Motion of pendulum of a clock~~ ii) A car moving in a market

4.a) A book lying on a table is an example of:
Ans- i) a Body at rest

b) The motion of a pendelum is:
Ans- ii) Oscillatory

c) A car moving on a straight road is an example of:
Ans- ii) Rectilinear motion.

d) A ball falls down vertically. Its motion is:

Ans- ii) linear

e) If a body covers equal distances in equal interval of time, the motion is said to be:

Ans- ii) ~~linear~~ uniform

f) A boy goes from his house to school by bus at a speed of 20 km h^{-1} and returns back through the same route at a speed of 30 km h^{-1}. The average speed of his journey is:

Ans- i) 24 km h^{-1}

g) The earth attracts a body of mass 1 kg with force of 10 N. The mass of a body is 50 kg. His weight will be:

Ans ii) 500 N

3.1. A body is said to be at rest if it does not change its position with respect to a fixed point in its surroundings.
When the position of a body with respect to its surroundings changes with time, the body is said to be in motion.

2. An object can be in motion relative to one set of objects while at rest relative to some other set of objects. Thus, rest and motion are relative terms.

Example- For a passenger in a moving train the other train moving with the same speed and in the same direction appears to be in motion.

3. a) A person walking in a compartment of a stationary train is in motion relative to the compartment and is in motion relative to the platform.

b) A person sitting in the compartment of a moving train is at rest relative to the other person sitting by his side and is in motion relative to the platform.

4. The five different types of motion are :-
   i) Translatory motion
   ii) Rotatary motion
   iii) Circular motion
   iv) Oscillatory motion
   v) Vibratory motion

5. In an object like a vehicle moves in a line in such a way that very point of the object moves through the same distance in the same time, then the

motion of the object is called translatory motion. Example - a moving cycle.

6. i) Rectilinear motion :- If the motion of a body is along a straight line. It is said to be a rectilinear or linear motion.
ii) Curvilinear motion: If the motion of a body is along a curved path, it is said to be a curvilinear motion.

Examples:
Rectilinear motion - Bullet fired from a gun.
Curvilinear motion - A cycle taking turn on a road.

7. A body is said to be in rotatory motion if it moves about a fixed axis.
Ex - Rotation of Earth and spinning top.

8. The motion of a body along a circular path is called circular motion. Ex - motion of a satellite around the Earth.

9. In rotatory motion, the axis of rotation passes from a point in the body itself whereas in circular motion, the axis of revolution passes through a point outside the body.

10. The to and fro motion of a body from its rest position (or mean position) is called the oscillatory motion. Example - The bob of pendulum from its rest position O moves to one side A, comes back to the rest position O and then moves to the other side B and then comes back to rest position O. This process is continiously repeated.

11. It is also an oscillatory motion with the difference that
In vibratory motion, a part of the body always remains fixed and rest part moves to and fro about its mean position. Musical instruments example guitar, violin etc.

12. A periodic motion gets repeated after regular intervals of time. The earth moving around the sun takes 365 days

to complete one revolution and this motion gets repeated after every 365 days. Whereas non-periodic motion does not repeat itself after regular intervals of time. For ex- footballer running on a field, application of brakes, tides in the sea gradually slows down and finally stops.

13. When an object in a motion has no specific parts and which suddenly changes its motion it is said to have a random motion, it is said to have random motion. Ex- A flying bird.

14. a) Vehicle on a straight road - Rectilinear Translatory motion

b) Blades of an electric fan in motion - circular motion

c) Pendulum of a wall clock - Oscillatory, periodic motion

d) Smoke particles from chimney - Random motion.

e) Hands of a clock - circular motion

f) Earth around the sun - Circular, periodic motion.

g) A spinning top - Rotatory motion

15. Two examples to illustrate that a body can have two or more types of motion simultaneously are :-

i) The wheels of a moving vehicle such as cycle, car train, etc. have both translatory motion and rotatory motions.

ii) A drill used by a carpenter has both rotatory as well as translatory motions.

16. a) Periodic, oscillatory motion
b) translatory, rotatary motion
c) translatory, rotary motions
d) translatory oscillatory,

17.

Uniform Motion	Non-uniform motion
1) When a body covers equal distances in a straight line in equal intervals of time is called uniform motion.	1) When a body covers unequal distances in a straight line in equal intervals of time is called non-uniform motion.
2) Direction of motion remains same.	2) Direction of motion change.
Example- A vehicle moving with a constant speed in a straight line is uniform motion	Example- A boy cycling in a busy curved road.

18. In a non-uniform motion the average speed of a body is calculated as

Average speed (v) = $\frac{\text{Total distance travelled } (d)}{\text{Total time taken } (t)}$

19. The weight of a body is the force with which the Earth attracts the body. S.I unit of weight is newton (N).

20. kgf is related to newton as
1 kgf = 10 N
or more precisely 1 kgf = 9.8 N

21.

Mass	Weight
1) It is the quantity of matter contained in a body	1) It is the force with which the Earth attracts the body.
2) Its S.I unit is kilogram (kg)	2) Its S.I unit is newton (N) and another unit is kilogram force (kgf) where 1 kgf = 10 N (mean)
3) It is measured by a beam balance.	3) It is measured by spring balance.

22. Mass does not change from place to place.

23. Weight is always directed vertically downwards.

C 1. Average speed (v) = $\frac{\text{Distance travelled (d)}}{\text{time taken (t)}}$

$= \frac{160\,km}{4\,h} = 40\,km\,h^{-1}$

2. $V = \frac{D}{t} \therefore t = \frac{D}{V} = \frac{300\,km}{60\,km\,h^{-1}} = 5h$

3. $1min = 60\,sec$, $20\,min = 20 \times 60 = 1200\,sec$

$v = \frac{D}{t} \therefore D = v \times t$

$= 10\,m\,s^{-1} \times 1200\,sec$

$= 12000\,m$ or $12\,km$

4. His motion is non uniform motion.

~~$t = 1min = 60\,sec$, $30\,min = 30 \times 60 =$~~

~~Average speed = 30~~

$1min = 60\,sec$, $1.5\,min = 1.5 \times 60$

$= 90\,sec = 90\,sec$

Average speed = $\frac{30m + 30m}{60 + 90\,sec}$

$= \frac{60m}{150sec} = \frac{2m}{5sec} = 0.4\,m\,s^{-1}$

5. Average speed in $km\ h^{-1}$

$$= \frac{1\ km + 0.5\ km + 0.3\ km}{1\ h + 1\ h + 1\ h}$$

$$= \frac{1.8\ km}{3\ h}$$

$$= 0.6\ km\ h^{-1}$$

As, $1\ km\ h^{-1} = \frac{5}{18}\ m\ s^{-1}$

$\therefore 0.6\ m\ h^{-1} = \frac{5}{18} \times 0.6 = \frac{1}{6}\ km = 0.166\ km\ h^{-1}$

$= 0.167\ km\ h^{-1}$

6. a) $v = \frac{D}{t}$ $\therefore D = v \times t$ $1\ min = \frac{1}{60}\ h$, $30\ min = \frac{30}{60}\ h = 0.5\ h$

distance travelled in first case

$= 30\ km\ h^{-1} \times 0.5\ h$

$= 30 \times \frac{5}{10} = 15\ km$

Second case $= 40\ km\ h^{-1} \times 1$

$= 40\ km$

So, total distance travelled $= 15 + 40$

$= 55\ km$

b) Total time travel $= 0.5 + 1 = 1.5\ h$

c) Average speed of car $= \frac{55\ km}{1.5\ h} = \frac{55}{\frac{15}{10}}$

$= \frac{55 \times 10}{15} = \frac{110}{3} = 3$

$= 36.666\ km\ h^{-1} = 36.6\ km$

7. Weight of a body of mass 1kg = 10N

a) Weight of the body of mass 37kg = 37kgf

b) Weight of the body of mass 37 kgf = 37 × 10
= 370N

8. The weight of a body of mass 6kg on moon = 10N

a) Mass remains unchanged. It remains same.

So, mass of boy 30 kg on Earth is also 30 kg on Moon surface.

b) Weight of the boy on moon becomes $\frac{1}{6}$ th.

∴ 30 kg will be $30 \times \frac{1}{6} = 5$ kg

1 kg = 10 N

5 kg = 5 × 10 N = 50 N

∴ The weight of the body on moon surface = 50 N.