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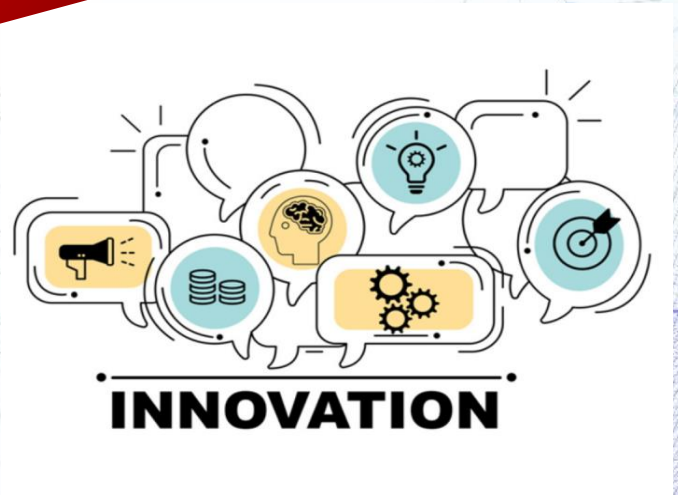
MILLAT FOUNDATION FOR EDUCATION RESEARCH & DEVELOPMENT

Innovation never comes from the established institutions.

it's always a Graduate student or a Crazy person or Somebody with a Great Vision



MFERD
MILLAT FOUNDATION FOR EDUCATION RESEARCH & DEVELOPMENT

بسم الله الرحمن الرحيم

19th AMC Shaping Generations
Educating in the age of AI

19th Annual Mllat Conference (AMC)

GEAR-UP YOUR SCHOOLS

THE NEXT LEVEL OF TECH PREPAREDNESS (IN TERMS OF SCHOOL INFRASTRUCTURE)

Speaker:

Mohammad Bilal MSc(Phy), M Ed(OU)

Chairman

Crescent Group Of Institutions

Adilabad-Telangana

Day

Two Ideas

- Idea of mindset

Idea of Mastery

If we learn

- martial art: we get mastery in white belt then learn yellow belt

- Music : we practice basic piece over and over, master it and then we move to advance ones

This is the Idea of Mastery

- But In Traditional academic model

- we group students together usually by age

- shepherd them all together at the same pace

- Teach something (say Exponentials)
  on lecture – Home work - lecture- Home work model

We repeat this for 2-3 weeks then take the test

- in that test I get 75%,Some body 85%, 60%, 95%

- and even thought the teat identify gaps in our knowledge

- i don't know 25%, some body 15%, 40%, 5%, of material
- Even though we identify those gaps,

- The whole class will then move on the next level of subject
- Probably a more advance one that’s going to build on those gap

- that may be negative exponential or logarithm

and that process continues and you immediately start to realize, how strange this is

i don’t know 25% of the more fundamental thing and now i am being pushed to the more advanced thing

and this will continue for months, years and the way until at some point

I might be in an algebra class or a trigonometry class and I hit a wall

And it is not because algebra is fundamentally difficult or because the student is not bright

It is because I am seeing an equation and they’re dealing with exponents and that 30% that i did not know is showing up and then I start to disengage

This is I believe the Idea of Mindset

The Idea of Mindset

to appreciate how absurd that is

Imagine if we did other things in our life that way say Home building.

We give 2 weeks of time to a contractor ask him to finish foundation work

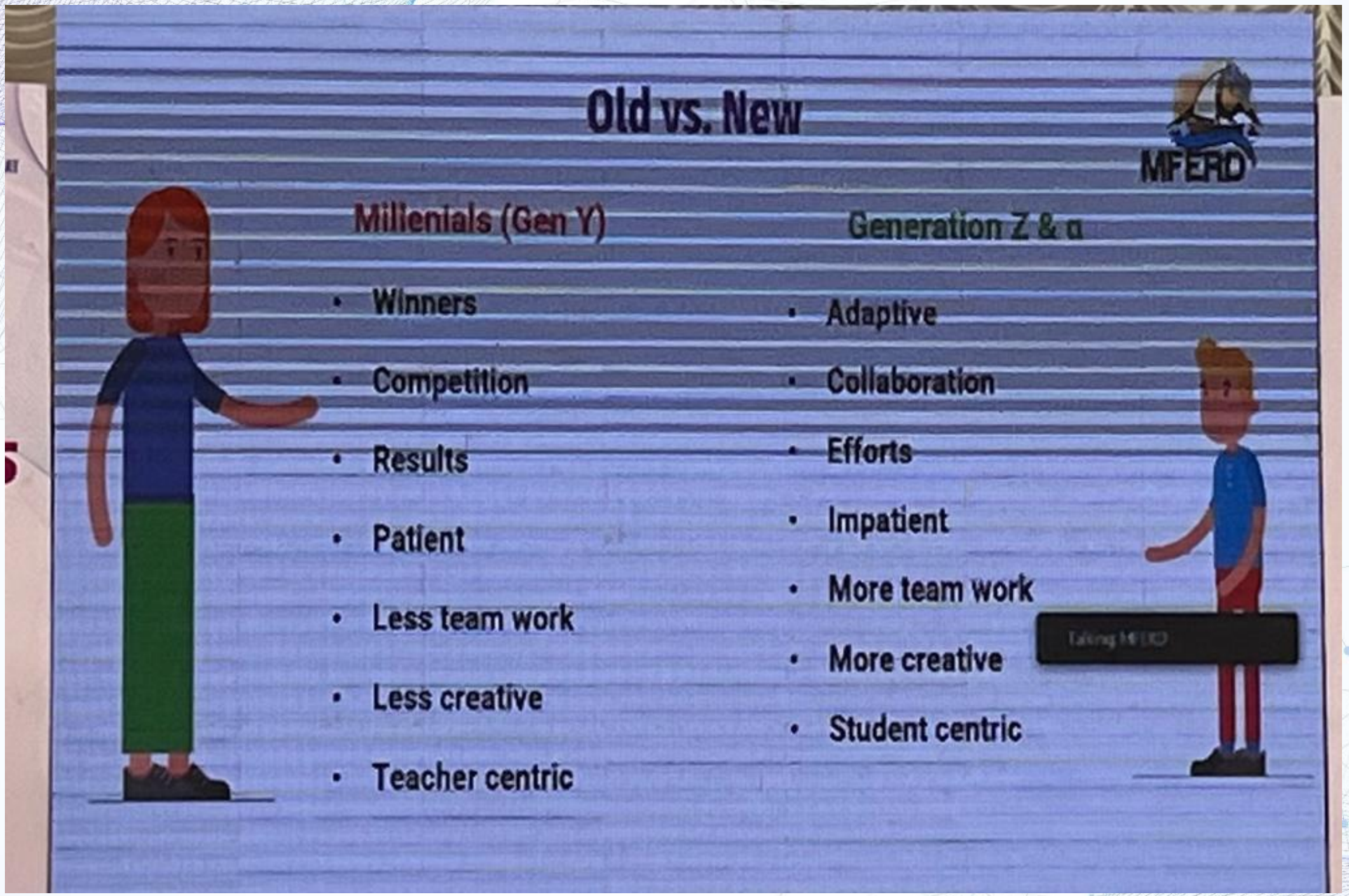
and

after 2 weeks because of rains or some labour issues the foundation work is not completed and then Enginer visits the site and say ok u have completed 75% of work great now let us move to brick work for 2 weeks

After 2 weeks the work done is 85%

Then we say great let us go with slab work for next 2 weeks

So on if keep building imagine after 1 -2 floors building get collapsed


Old vs. New
MFERD
Milienials (Gen Y)
Winners
Competition
Results
Patient
Less team work
Less creative
Teacher centric
Generation Z & α
Adaptive
Collaboration
Efforts
Impatient
More team work
More creative
Student centric

Video content

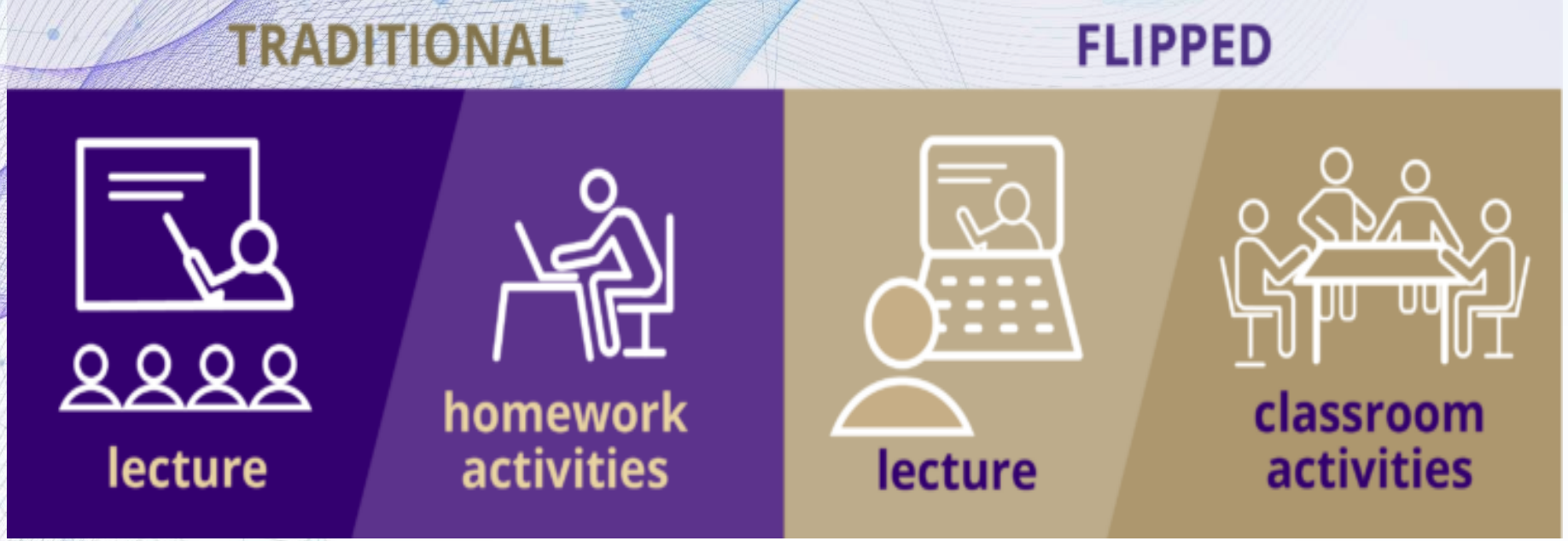
Individuality

Online

Virtual

Gamified

Remote learning



Flipping the Class Room

- Learn the concepts at home and do the modules at school
- No text books and no teaching lectures at Black Board

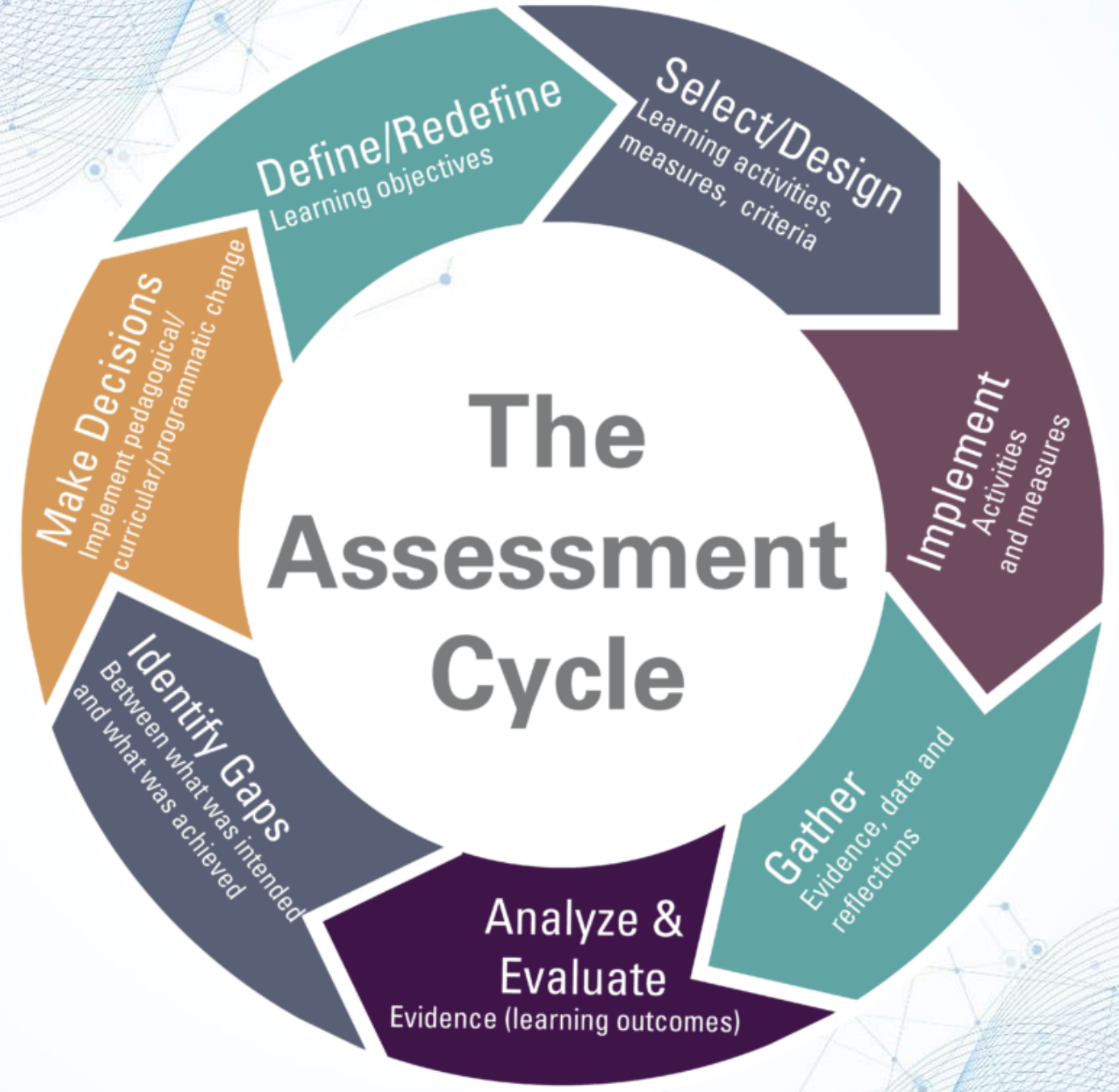
- Instead Students watch the Video on concept at home night before
- To learn a concept and
- They come to class next day and do Problem set called modules to make sure that they understand.

- If they get stuck they can get one to one help from the peers or teacher
- Less teaching more interaction
- what you think of as home work you do at school
- and school work you do at home
- Child will learn in his personal own pace and time
- it’s call flipping the classroom.

- It’s gives a big boost to the students who don’t like Text Books
- students can rewind the videos and watch it again if needed, (for student having trouble on the practice)
- students can take as much time as they need to learn concept.
- History and science can also be learnt through flipping the classroom

MARZANO SCALE

AI BASED ASSESSEMNT – Like Grow On




Assignment


DASHBOARD
HOMEWORK
ANNOUNCEMENT
QUIZ
POLL
GROUPS
WALL
POST
STUDENTS
TIME TABLE
ATTENDANCE
CALENDAR
SCHOOL
INFORMATION

Every one Needs a coach

- In todays world everyone is getting improved

- We all need people who will give us feedback. That’s how we improve

- Unfortunately there is one group of people who get almost no systematic feedback to help them to do their jobs better and
- These people have one of the most important jobs in the world.

I am talking about

- For Rest of the World it is a school

- For a small child it is her Teacher

- Over 98% of teachers just get one word of feedback “**SATISFACTORY**”

- If all our Football/ Volleyball Coach over told us was that we were satisfactory,
- we would have no hope of ever getting better
- how would we know who was the best?
- how would we know what i was doing differently?
- today, districts are revamping the way they evaluate teachers
- But we still give them almost no feedback that actually helps them improve their practice

OUR TEACHERS DESERVE BETTER

- the system we have today is not fair to them
- Its not fair to the students
- and its putting our country’s leadership at risk.
- so today how we can help all teachers to get the tools for improvements they want and deserve
- lets start by asking who is doing well unfortunately there was no international ranking tables for teachers feedback system in the past
- When we look at the countries whose students perform well academically, and looked what they are doing to help their teacher to improve

- Number 1 in academic performance is shanghai, china
- in all reading/maths/and science

4 WAYS TO help teachers to improve

1- Younger teachers get a change to watch master teacher at work

2- Weekly study group teacher get together and talk about what's working

3- They even require each teacher to observe and give feedback to their colleagues

- there are so many variations in teaching profession

- some teachers are for effective than others infact there are teachers throughout the country who are helping their students make extra ordinary gain

- if today avg tr could become as good as those teachers
- our students would be blowing away the rest of the world

4- Measures of effective teaching

- observers to watch the videos teacher in class

Did they ask the challenging Q’s

- did they find multiple ways to multiple ideas
- Did they ask the Survey questions from the students
- Did the teacher knows when the class understand a lesson?
- Did teacher learn to correct her mistakes?
- It helps the teachers to improve specifically on weak areas

- There is a difference for teacher
  Between the abstract of how we see our practice
  and then the concrete reality of it

- Classroom video offers us certain Deference of reality

- u can’t really dispute what u see on the video

- And there is a lot to be learned from that

- And there are a lots of way that we can grow as profession when we actually get to see this

- It is really has been a simple but powerful tool in once own reflection
- writing what you seeing in video and use for own personal growth Personal reflection on Teaching strategy and Methodology and Classroom Management
- Video expresses so much of what's intrinsic to teachers to help teacher to learn and help teachers to understand
- and then help teacher broader communities understand
- exemplify and illustrate that things that teacher cannot convey in a lesson plan Things some time cannot convey in a book of pedagogy

- diagnosing areas where a teacher needs to improve is only half the battle
- we also have to give them tools that they need to act on the diagnosis
- If a teacher learn that she need to improve
  the way she teach fractions
- Teacher should be able to watch a video of
  the best person in the world teaching fractions
- so building this complete teachers feedback and improvement system
  wont be easy
- feedback would have even more important benefits for our country

- it would put us on a path to making sure all our students get a great education find a career that is fulling, and rewarding and have a chance to live out their dreams

- this wouldn't just make us a more successful country but also a fair one to.

The Grow On Team insha allah provide us the real time AI based feed back system

- I am exited about the opportunity, to give all our teachers the support they want and deserve
- I hope u are too.

SHARPEN YOUR AXE:

- Teachers training / professional growth
- Use of Zoom/ Google Meet/ ect.
  to learn from master trainer from
  entire globe
- Time saving
- Shariya Compliances .Cost effective
- Recorded content for better practice
- Daily Guiding light for every teacher to become a great teacher who can inspire the world
- Student Connectivity / collaboration of schools across india every Saturday- Leaders of Change
- Training of Group-D staff every Friday
- Learn the art of Parenting- Every Sunday
- It gives Real time feedback

We can Use AI driven real time Teacher Feedback system like youtube chat during teaching on youtube

Now let us Talk about the

Automate the Routine Tasks

by using AI based Platform

like – Grow On

School Management Software:

School Management Software:

Digital platform for all school needs

- Attendance teacher/ student transportation GPS track
- Fee/ Finance/ Income/ Expenditure/ Policy making
- Automation in fee collection/ Easy finance manaplate
- Assessment/ feedback/ reviews/ rating
- LMS/ online classes/ recorded videos/ online exams/ remote access/ digital library/ Content/ live dashboard
- Real time information
- Track the academic performance
- Inventory/ online store/ school store
- HR Management
- Security Management
- Teaching plan
- Access to school activity photographs
- Digital diary/ communicate to parents
- library management

Hand over the routine task to AI

Attendance

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we can Take Data Driven Ethical Decision

by using AI based Platform

SMART CLASSES

- Installation Of Smart Board/ Panel Board
- High speed Internet through Optical Fibre
- Power backup (UPS)
- Installation of Sound system/ Speakers/ Mic
- Security Features
- Cloud storage

Work, power and Energy

M. A. Rafi sir

quick Revision

work

:→ when a Constant force ($\bar{F}$) acts on the body & the body gets displaced ($\bar{s}$), then work is said to be done

$$W = \bar{F} \cdot \bar{s} = Fs\cos\theta$$

Note :→ Work is a scalar but even though it can have +ve, -ve values.

1) Work is +ve if $\bar{F}$ & $\bar{s}$ are parallel and acts along same direction (i.e $\theta = 0°$ b/n $\bar{F}$ & $\bar{s}$)

2) Work is -ve if $\bar{F}$ & $\bar{s}$ are antiparallel (or) acts oppositely i.e $\theta = 180°$ b/n $\bar{F}$ & $\bar{s}$)

3) Work is 0 if $\bar{F}$ & $\bar{s}$ r ⊥ar i.e $\theta = 90°$ b/n $\bar{F}$ & $\bar{s}$

4) S.I unit of work is Joule (J)
C.G.S " " " " erg

$1\,J = 10^7\,erg$

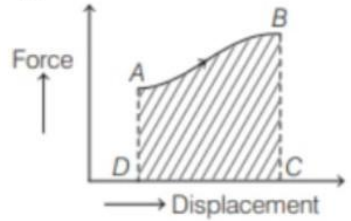
$1eV = 1.6 \times 10^{-19}\,J$
$1cal = 4.186\,J$
→ other units

Work done in different conditions

(i) Work done by a variable force is given by

$W = \int F \, . \, ds = \int F \cdot dx$

It is equal to the area under the force-displacement graph, along with proper sign.



Work done = Area ABCDA

(ii) Work done in displacing any body under the action of a number of forces is equal to the work done by the resultant force.

(iii) In equilibrium (static or dynamic), the resultant force is zero, therefore resultant work done is zero.

(iv) If work done by a force during a rough trip of a system is zero, then the force is **conservative**, otherwise it is called **non-conservative** force.

→ here F value will be given as a function of x

ex → $F = 2 + 3x^2 + 4x^3$ find work done

- Gravitational force, electrostatic force, magnetic force etc are conservative forces. All the central forces are conservative forces.
- Frictional force, viscous force etc are non-conservative forces.

(v) Work done by the force of gravity on a particle of mass m is given by $W = mgh$ where, g is acceleration due to gravity and h is height through which the particle is displaced.

(vii) When on end of a spring is attached to a fixed vertical support and a block attached to the free end moves on a horizontal table from $x = x_1$ to $x = x_2$, then $W = \frac{1}{2}k(x_2^2 - x_1^2)$.

(vi) Work done in compressing or stretching a spring is given by

$W = \frac{1}{2}kx^2$

work done by spring $W = -\frac{1}{2}kx^2$.

where, k is spring constant and x is displacement from mean position.

$W = \int F \cdot dx$

$x_1 = 0$ $\quad x_2 = x$

$W = \int_{x_1}^{x_2} F\,dx = \int_{x_1}^{x_2} kx\,dx = k\int_{x_1=0}^{x_2=x} x\,dx$

$\therefore W = k\left[\frac{x^2}{2}\right]_0^x = \frac{1}{2}kx^2$.

When a body moves with a constant speed along a circle

(a) no work is done on it

(b) no acceleration is produced in it

(c) its velocity remains constant

(d) no force acts on it. (1994)

Two similar springs P and Q have spring constants K_P and K_Q, such that $K_P > K_Q$. They are stretched first by the same amount (case a), then by the same force (case b). The work done by the springs W_P and W_Q are related as, in case (a) and case (b) respectively

(a) $W_P > W_Q$; $W_Q > W_P$

(b) $W_P < W_Q$; $W_Q < W_P$

(c) $W_P = W_Q$; $W_P > W_Q$

(d) $W_P = W_Q$; $W_P = W_Q$

Case(a) Case(b)

Case(a) same elongation

$x_P = x_Q$

$W_P = \frac{1}{2} K_P x_P^2$, $W_Q = \frac{1}{2} K_Q x_Q^2$

$W_P > W_Q$

Case(b) $F_P = F_Q$

$W_P = F_P x_P$ $W_Q = F_Q x_Q$

$W_Q > W_P$

In the case of conservative force

1) Work done is indepenent of the path
2) Work done in a closed loop is zero
3) Work done against conservative force is stored is the form of potential energy
4) All the above

Qn A position dependent force, $F = (7 - 2x + 3x^2)$ N acts on a small body of mass 2 kg and displaces it from $x = 0$ to $x = 5$ m. The work done in joule is

(a) 135 (b) 270

(c) 35 (d) 70 *(1994, 1992)*

Sol $W = \int F \cdot dx$

$= \int (7 - 2x + 3x^2)\, dx = 7\int_0^5 dx - 2\int_0^5 x\, dx + 3\int_0^5 x^2 dx$

$= 7[x]_0^5 - 2\left[\frac{x^2}{2}\right]_0^5 + 3\left[\frac{x^3}{3}\right]_0^5 = 7(5) - 5^2 + 5^3$

$W = 35 - 25 + 125 = 135$

Qn→ **Example 6.3** A cyclist comes to a skidding stop in 10 m. During this process, the force on the cycle due to the road is 200 N and is directly opposed to the motion. (a) How much work does the road do on the cycle ? (b) How much work does the cycle do on the road ?

Sol (a) Work done by road

$W = F \cdot S = 200 \times 10 = -2000\,J$ ($\because$ −ve sign indicates F & S are opp (or) $\theta = 180^\circ$)

(b) Work done by cycle on road.

$W = 0\,J$ (as displacement is zero in road).

A uniform force of $(3\hat{i}+\hat{j})$ newton acts on a particle of mass 2 kg. Hence the particle is displaced from position $(2\hat{i}+\hat{k})$ metre to position $(4\hat{i}+3\hat{j}-\hat{k})$ metre. The work done by the force on the particle is

(a) 13 J (b) 15 J

(c) 9 J (d) 6 J *(NEET 2013)*

Sol $W = \bar{F} \cdot \bar{r} = \bar{F} \cdot (\bar{r}_2 - \bar{r}_1)$

$W = (3i+j) \cdot [4i+3j-k-(2i+k)]$

$W = (3i+j) \cdot (2i+3j-2k)$

$W = 6(1)+3(1) = 9\,J$

Qn→ A body moves a distance of 10 m along a straight line under the action of a 5 N force. If the work done is 25 J, then angle between the force and direction of motion of the body is

(a) 60° (b) 75° (c) 30° (d) 45° *(1997)*

Sol

$$W = FS\cos\theta$$

$$25 = 5 \times 10 \cos\theta$$

$$\frac{5}{10} = \cos\theta$$

$$\frac{1}{2} = \cos\theta$$

$$\theta = 60^\circ$$

Qn A body, constrained to move in y-direction, is subjected to a force given by $\vec{F} = (-2\hat{i} + 15\hat{j} + 6\hat{k})$ N. The work done by this force in moving the body through a distance of $10\hat{j}$ m along y-axis, is

(a) 150 J (b) 20 J

(c) 190 J (d) 160 J

Sol $W = \vec{F} \cdot \vec{S}$

$W = (-2\hat{i} + 15\hat{j} + 6\hat{k}) \cdot (10\hat{j})$

$W = 150\,J$

Mechanical Energy

The sum of kinetic and potential energy is known as mechanical energy.
Mechanical energy is of two types

1. Kinetic Energy

The energy possessed by any object by virtue of its motion is called its kinetic energy.
Kinetic energy of an object is given by

$$K = \frac{1}{2}mv^2 = \frac{p^2}{2m}$$

where, m = mass of the object, v = velocity of the object and $p = mv$ = momentum of the object.

also we can use $p = \sqrt{2m(K.E)}$

$W = K.E_f - K.E_i$

Qn A bullet of mass 10 g leaves a rifle at an initial velocity of 1000 m/s and strikes the earth at the same level with a velocity of 500 m/s. The work done in joule for overcoming the resistance of air will be

(a) 375 (b) 3750 (c) 5000 (d) 500

Sol

$$W = K.E_f - K.E_i$$

$$W = \frac{1}{2} \times 10 \times 10^{-3}\left[(500)^2 - (1000)^2\right]$$

$$W = \frac{10^{-2}}{2} \times (25 - 100)$$

$$W = -3750\,J$$

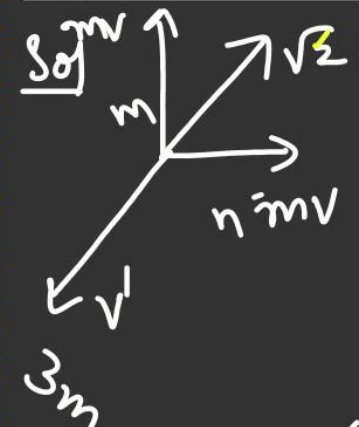
A particle of mass $5m$ at rest suddenly breaks on its own into three fragments. Two fragments of mass m each move along mutually perpendicular direction with speed v each. The energy released during the process is

(a) $\frac{3}{5}mv^2$ (b) $\frac{5}{3}mv^2$

(c) $\frac{3}{2}mv^2$ (d) $\frac{4}{3}mv^2$

(Odisha NEET 2019)

Sol



$$V' = \sqrt{2}\,V$$

$$3mV' = \sqrt{2}\,mV$$

$$V' = \frac{\sqrt{2}}{3}V$$

$$K.E_{tot} = \frac{1}{2}mv^2 + \frac{1}{2}(3m)V^2 = \frac{4mv^2}{3}$$

19) Two bodies with kinetic energies in the ratio of 4 : 1 are moving with equal linear momentum. The ratio of their masses is

(a) 4 : 1 (b) 1 : 1 (c) 1 : 2 (d) 1 : 4. *(1999)*

20) Two bodies of masses m and $4m$ are moving with equal kinetic energies. The ratio of their linear momenta is

(a) 1 : 2 (b) 1 : 4 (c) 4 : 1 (d) 1 : 1.

(1998, 1997, 1989)

Sol 1

$$\frac{K.E_1}{K.E_2} = \frac{\frac{p_1^2}{2m_1}}{\frac{p_2^2}{2m_2}}$$

$$\frac{4}{1} = \frac{m_2}{m_1}$$

$$\frac{m_1}{m_2} = \frac{1}{4}$$

Sol 2

$$\frac{p_1}{p_2} = \frac{\sqrt{2m(K.E_1)}}{\sqrt{2(4m)(K.E_2)}}$$

$$\frac{p_1}{p_2} = \frac{1}{2}$$

A particle of mass m_1 is moving with a velocity v_1 and another particle of mass m_2 is moving with a velocity v_2. Both of them have the same momentum but their different kinetic energies are E_1 and E_2 respectively. If $m_1 > m_2$ then

(a) $E_1 < E_2$

(b) $\frac{E_1}{E_2} = \frac{m_1}{m_2}$

(c) $E_1 > E_2$

(d) $E_1 = E_2$

(2004)

So

$$\frac{K.E_1}{K.E_2} = \frac{\frac{p^2}{2m_1}}{\frac{p^2}{2m_2}} = \frac{m_2}{m_1}$$

$$\frac{K.E_1}{K.E_2} = \frac{m_2}{m_1}$$

Given $m_1 > m_2$

so

$\therefore K.E_1 < K.E_2$

A ball of mass 2 kg and another of mass 4 kg are dropped together from a 60 feet tall building. After a fall of 30 feet each towards earth, their respective kinetic energies will be in the ratio of

(a) $\sqrt{2}:1$ (b) $1:4$

(c) $1:2$ (d) $1:\sqrt{2}$ *(2004)*

Sol $\frac{K.E_1}{K.E_2} = \frac{\frac{1}{2}m_1v_1^2}{\frac{1}{2}m_2v_2^2}$

Since $v_1^2 = v_2^2 = 2gh$ we have

$\frac{K.E_1}{K.E_2} = \frac{m_1}{m_2} = \frac{2}{4} = \frac{1}{2}$ //

A stationary particle explodes into two particles of masses m_1 and m_2 which move in opposite directions with velocities v_1 and v_2. The ratio of their kinetic energies E_1/E_2 is

(a) m_2/m_1 (b) m_1/m_2

(c) 1 (d) m_1v_2/m_2v_1 *(2003)*

Sol From law of Conservation of Momentum:

$m_1v_1 = -m_2v_2$

$\frac{K.E_1}{K.E_2} = \frac{\frac{1}{2}m_1v_1^2}{\frac{1}{2}m_2v_2^2} \times \frac{m_1m_2}{m_1m_2} = \frac{(m_1v_1)^2}{(m_2v_2)^2} \times \frac{m_2}{m_1}$

$\therefore$ option (a) ✓

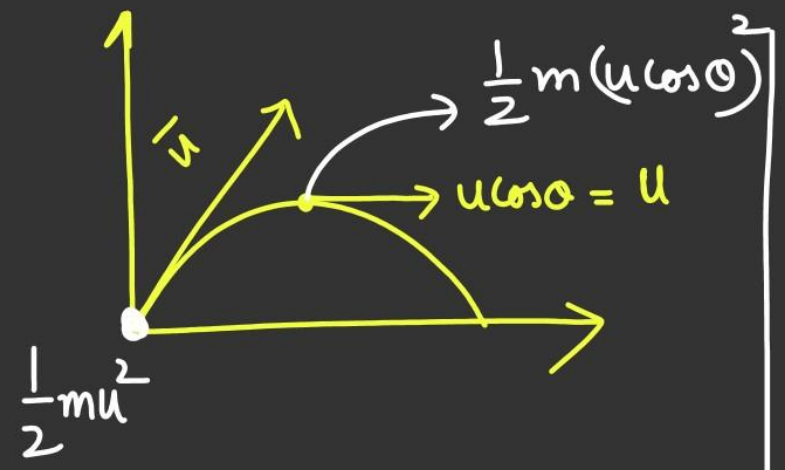
19) If kinetic energy of a body is increased by 300% then percentage change in momentum will be

(a) 100% (b) 150%

(c) 265% (d) 73.2%. *(2002)*

20) A particle is projected making an angle of 45° with horizontal having kinetic energy K. The kinetic energy at highest point will be

(a) $\frac{K}{\sqrt{2}}$ (b) $\frac{K}{2}$ (c) $2K$ (d) K



$K.E_1 = \frac{1}{2}mu^2$

$K.E_2 = \frac{1}{2}m\left(\frac{u}{\sqrt{2}}\right)^2$

$= \frac{K.E_1}{2}$

option (b) ✓

Sol $K.E_1 = \frac{1}{2}mv^2$

$K.E_2 = \frac{1}{2}mv^2 + \frac{300}{100}\frac{1}{2}mv^2$

$K.E_2 = 4\frac{1}{2}mv^2$

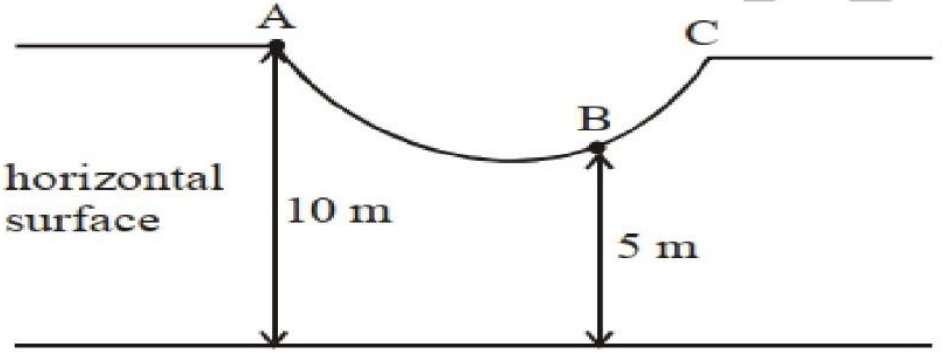
$\frac{K.E_1}{K.E_2} = \frac{P_1^2/2m}{P_2^2/2m}$

$\frac{1}{4} = \frac{P_1^2}{P_2^2}$

$\Rightarrow P_2 = 2P_1 = P_1 + \frac{100}{100}P_1$

So momentum is 100% increased.

(3) As shown in the figure, a particle of mass $10\ kg$ is placed at a point A. When the particle is slightly displaced to its right, it starts moving and reaches the point B. The speed of the particle at B is $x\ m/s$. (Take $g = 10\ m/s^2$) The value of 'x' to the nearest integer is.....



(A) 5
(B) 8
(C) 12
(D) 10

Sol $W = K.E_f - K.E_i$

$mgh = \frac{1}{2}mx^2$

$2(10)(10) = \frac{1}{2}\times 10(x)^2$

$x^2 = 200$

$x = 10\sqrt{2}$

$x = 14.14\ ms^{-1}$

$x = 12$ (nearest to Ans)

(1) A time dependent force $F = 6t$ acts on a particle of mass $1\ kg$. If the particle starts from rest, the work done by the force during the first 1 secand will be ..... J

(A) 4.5 (B) 22

(C) 9 (D) 18

(2) A particle which is experiencing a force, given by $\vec{F} = 3\vec{i} - 12\vec{j}$, undergoes a displacement of $\vec{d} = 4\vec{i}$. If the particle had a kinetic energy of $3\ J$ at the beginning of the displacement, what is its kinetic energy at the end of the displacement?

(A) $9\ J$ (B) $12\ K$

(C) $10\ J$ (D) $15\ J$

Sol $W = K.E_f - K.E_i$

$K.E_f = [(3i - 12j) \cdot (4i)] + 3$

$K.E_f = 15\ J$

$u = 0$

Sol $F = 6t$

$m\frac{dv}{dt} = 6t$

$1\ dv = 6t\ dt$

$\int dv = 6\int_0^1 t\ dt$

$v = 6\left[\frac{t^2}{2}\right]_0^1 = 6\left(\frac{1}{2}\right) = 3\ ms^{-1}$

$W = \frac{1}{2}mv^2 = \frac{1}{2} \times 1 \times 3^2 = \frac{9}{2} = 4.5\ J$

(8) A block of mass $10\,kg$, moving in x direction with a constant speed of $10\,ms^{-1}$, is subjected to a retarding force $F = 0.1x\,J/m$ during its travel from $x = 20\,m$ to $30\,m$. Its final KE will be ..... J

(A) 475 (B) 450

(C) 275 (D) 250

Sol $W = K_f - K_i$

$$-\int F dx = K_f - \frac{1}{2}\times 10\times 10^2$$

$$-0.1\int_{20}^{30} x\,dx = K_f - 500$$

$$-0.1\left[\frac{x^2}{2}\right]_{20}^{30} = K_f - 500$$

$$-0.1\left[\frac{900}{2} - \frac{400}{2}\right] = K_f - 500$$

$$-0.1\left[\frac{500}{2}\right] = K_f - 500$$

$$-25 = K_f - 500$$

$$K_f = 500 - 25 = 475\,J$$

(6) A lorry and a car moving with the same K.E. are brought to rest by applying the same retarding force, then

(A) Lorry will come to rest in a shorter distance

(B) Car will come to rest in a shorter distance

(C) Both come to rest in a same distance

(D) None of the above

(7) The kinetic energy acquired by a mass m in travelling a certain distance d starting from rest under the action of a constant force is directly proportional to

(A) $\sqrt{m}$ (B) Independent of m

(C) $1/\sqrt{m}$ (D) m

(4) A body of mass $5\,kg$ is moving with a momentum of $10\,kg\,ms^{-1}$. Now a force of $2\,N$ acts on the body in the direction of its motion for $5\,s$. The increase in the Kinetic energy of the body is ..... J.

(A) 30 (B) 29

(C) 28 (D) 27

good Qn

Sol $I = P_f - P_I$

$2 \times 5 = P_f - 10$

$P_f = 20\ kg\,ms^{-1}$

$\Delta K.E = \frac{P_f^2}{2m} - \frac{P_I^2}{2m}$

$\Delta K.E = \frac{400}{2\times5} - \frac{100}{2\times5}$

$\Delta K.E = 30\ J$

(5) A car accelerates from rest to $u\,m/s$. The energy spent in this process is $E\,J$. The energy required to accelerate the car from $u\,m/s$ to $2u\,m/s$ is $nE\,J$. The value of n is .....

(A) 6 (B) 3

(C) 9 (D) 12

$u=0 \rightarrow v$

Sol $u=0$, $v = u\ ms^{-1}$, $\Delta E = E$

$\Delta K.E = K_f - K_i$

$E = \frac{1}{2}mu^2$

$nE = \frac{1}{2}m(2u)^2 - \frac{1}{2}mu^2$

$nE = 4\left(\frac{1}{2}mu^2\right) - \frac{1}{2}mu^2 = 3E$

$\Rightarrow n = 3$

Example 6.28 An object of mass 5 kg falls from rest through a vertical distance of 20 m and attains a velocity of 10 ms^{-1}. How much work is done by the resistance of the air on the object? (Take, $g = 10\,ms^{-2}$)

$u = 0$

(a) $-650J$ (b) $450J$ (c) $-250J$ (d) $-750J$

Sol $W = K_f - K_i$

$W_g + W_{air} = K_f$

$5 \times 10 \times 20 + W_{air} = \frac{1}{2} \times 5 \times 10^2$

$W_{air} = 250 - 1000$

$W_{air} = -750J$

Good Q^n

Example 6.29 A particle of mass m moves with velocity $V = a\sqrt{x}$ where a is a constant. Find the total work done by all the forces during a displacement from $x = 0$ to $x = d$.

(1) $\frac{1}{2}ma^2d$ (2) $\frac{1}{2}mad$ (3) $\frac{1}{2}mad^2$ (4) None

Sol $W = K_f - K_i$

$= \frac{1}{2}mv_f^2 - \frac{1}{2}mv_i^2$

$= \frac{1}{2}m(a\sqrt{d})^2 - \frac{1}{2}m(a\sqrt{0})^2$

$\therefore W = \frac{1}{2}ma^2d$

Example 6.21 *When a man increases his speed by 2 ms^{-1}, he finds that his kinetic energy is doubled. Find the original speed of the man.*

(a) $2(\sqrt{3}+1)$ (b) $2(1+\sqrt{2})$ (c) $2(\sqrt{5}+1)$ (d) $2(\sqrt{2}-2)$

Sol $V_1 = V$

$V_2 = (V+2)\,ms^{-1}$

$K_1 = K_1$

$K_2 = 2K_1$

$$\frac{K_1}{K_2} = \frac{\frac{1}{2}mv^2}{\frac{1}{2}m(v+2)^2}$$

$$\frac{1}{2} = \frac{v^2}{v^2+4+4v}$$

$$v^2+4+4v = 2v^2$$

$$\therefore v^2 - 4v - 4 = 0.$$

roots for quadratic eqn

$$V = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$$

$$V = \frac{4 \pm \sqrt{16-4(1)(-4)}}{2(1)}$$

$$V = \frac{4 \pm \sqrt{32}}{2} = \frac{2(1 \pm \sqrt{2})}{2}$$

$$V = 2(1 \pm \sqrt{2})$$

Example 6.4 In a ballistics demonstration a police officer fires a bullet of mass 50.0 g with speed 200 m s^{-1} (see Table 6.2) on soft plywood of thickness 2.00 cm. The bullet emerges with only 10% of its initial kinetic energy. What is the emergent speed of the bullet ?

(NCERT Qn).

Sol If a bullet has mass 50.0 gm = 0.05 kg & speed 200 ms^{-1}, then initial

$$K.E = \frac{1}{2}mv^2 = \frac{1}{2}(0.05)\times(200)^2$$

$$= \frac{1}{2}\times 5\times 10^{-2}\times 4\times 10^{4}$$

$$= 10^3 J$$

Given final K.E $= \frac{10}{100}(10^3 J)$

$= 100 J$.

So $\frac{1}{2}mv_f^2 = 100$

$$v_f = \sqrt{\frac{2\times 100}{0.05}}$$

$$v_f = \sqrt{\frac{2\times 10^2}{5}\times 40}$$

$$\therefore \boxed{v_f = 63.2\ ms^{-1}}$$

NCERT pts :— The total Mechanical energy remains Constant if the work is done by Conservative forces.

P.E is dependent on position

2. Potential Energy

The energy possessed by any object by virtue of its position or configuration is called its potential energy.

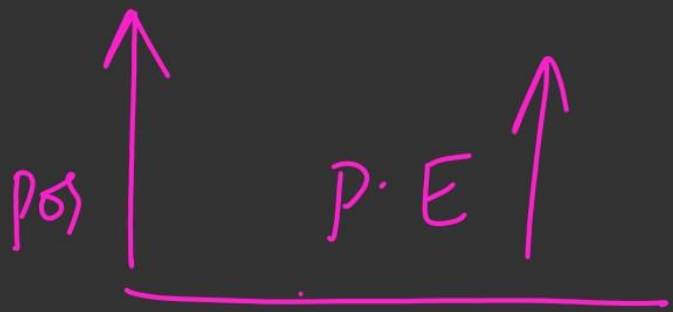
In one dimensional motion, potential energy U(x) is defined if force F(x) can be written as

$$F(x) = -\frac{dU}{dx}$$

or $F(x) \cdot dx = -dU$

or $\int_{x_i}^{x_f} F(x) \cdot dx = -\int_{U_i}^{U_f} dU = U_i - U_f$

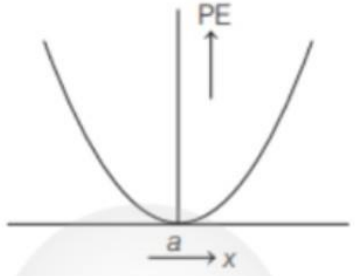
Potential energy is defined only for conservative forces. It does not exist for non-conservative forces.

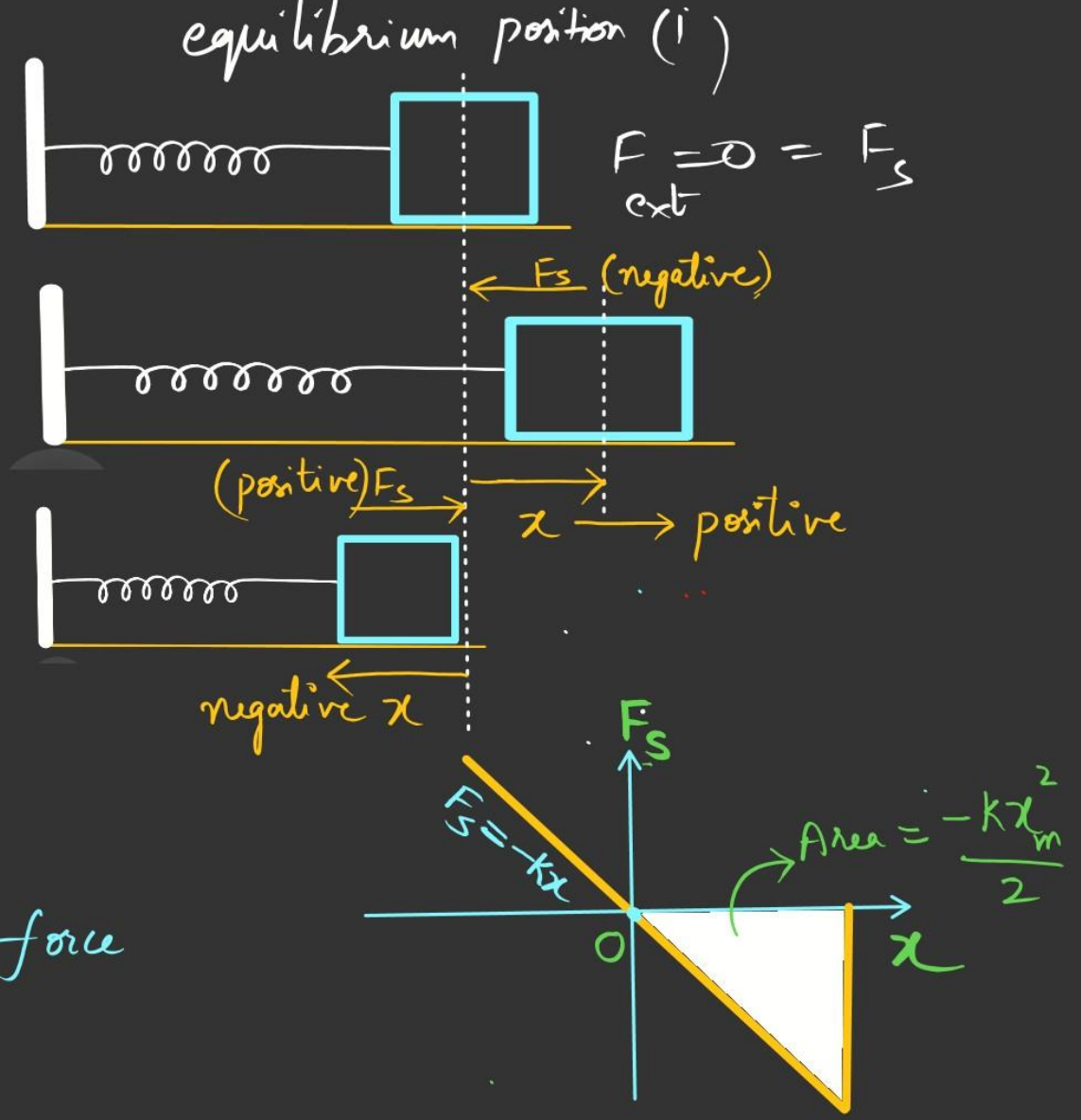


(i) Gravitational Potential Energy If a body of mass m is raised through a height h against gravity, then its gravitational potential energy = mgh.

(ii) Elastic Potential Energy If a spring of spring constant k is stretched through a distance x, then elastic potential energy of the spring $= \frac{1}{2}kx^2$.

The variation of potential energy with distance is shown in figure.





Note :→ Spring force is variable force which is conservative.

Note :→ 1) If the extension is x_m, work done by the spring force is

$$W_s = \int_0^{x_m} F_s \, dx$$

$$W_s = -\int_0^{x_m} kx \, dx$$

$$\boxed{W_s = \frac{-kx_m^2}{2}}$$

2) potential energy of spring for an extension/compression x is

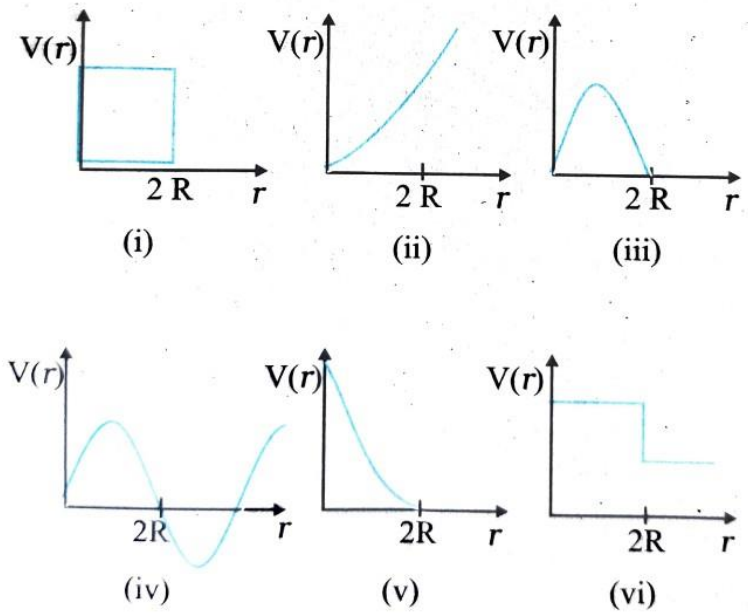
$$\boxed{P.E = \frac{kx^2}{2}}$$

③ Speed & K.E will be maximum at equilibrium position (i.e $x_m = 0$)

i.e $\frac{1}{2} m v_m^2 = \frac{1}{2} k x_m^2$

$$\boxed{v_m = \sqrt{\frac{k}{m}}\, x_m}$$

6.29 Which of the following potential energy curves in Fig. 6.18 cannot possibly describe the elastic collision of two billiard balls ? Here r is the distance between centres of the balls.



Ans

In (1), (2), (3), (4), (6) the position of balls is decreasing hence in above cases P.E is decreased but in graphs either P.E is shown as constant or increasing.

Good Q.

A vertical spring with force constant k is fixed on a table. A ball of mass m at a height h above the free upper end of the spring falls vertically on the spring so that the spring is compressed by a distance d. The net work done in the process is

(a) $mg(h+d)-\frac{1}{2}kd^2$

(b) $mg(h-d)-\frac{1}{2}kd^2$

(c) $mg(h-d)+\frac{1}{2}kd^2$

(d) $mg(h+d)+\frac{1}{2}kd^2$ (2007)

Net work done $= W_{mg} + W_{Spring}$

$= mg(h+d) - \frac{1}{2}kd^2$

net . work

The potential energy of a long spring when stretched by 2 cm is U. If the spring is stretched by 8 cm the potential energy stored in it is

(a) $U/4$ (b) $4U$

(c) $8U$ (d) $16U$ (2006)

Sol

$x_1 = 2\text{ cm}$

$P.E_1 = U$

$P.E_1 = \frac{1}{2}Kx_1^2$

$U = \frac{1}{2}K(4)$

$x_2 = 8\text{ cm}$

$P.E_2 = ?$

$P.E_2 = \frac{1}{2}K(64)$

$\frac{U}{P.E_2} = \frac{\frac{1}{2}K(4)}{\frac{1}{2}K(64)}$

16

$P.E_2 = 16U$

Two springs A and B having spring constant K_A and K_B ($K_A = 2K_B$) are stretched by applying force of equal magnitude. If energy stored in spring A is E_A then energy stored in B will be

(a) $2E_A$ (b) $E_A/4$

(c) $E_A/2$ (d) $4E_A$ (2001)

Sol $P.E = \frac{F}{2K}$

$$\frac{P.E_A}{P.E_B} = \frac{\frac{F^2}{2K_A}}{\frac{F^2}{2K_B}}$$

$P.E \propto \frac{1}{K}$

$$\frac{P.E_A}{P.E_B} = \frac{K_B}{K_A} = \frac{K_B}{2K_B}$$

$$P.E_B = 2\,P.E_A$$

A mass of 0.5 kg moving with a speed of 1.5 m/s on a horizontal smooth surface, collides with a nearly weightless spring of force constant $k = 50$ N/m. The maximum compression of the spring would be

(a) 0.15 m (b) 0.12 m
(c) 1.5 m (d) 0.5 m (2004)

So the K.E of the moving body = energy produced in the spring.

$$\frac{1}{2}mv^2 = \frac{1}{2}Kx^2$$

$$x = \sqrt{\frac{mv^2}{K}}$$

$$= \sqrt{\frac{0.5 \times 2.25}{50}}$$

$$x = 0.15 \text{ m}$$

A block of mass M is attached to the lower end of a vertical spring. The spring is hung from a ceiling and has force constant value k. The mass is released from rest with the spring initially unstretched. The maximum extension produced in the length of the spring will be

(a) $2Mg/k$ (b) $4Mg/k$

(c) $Mg/2k$ (d) Mg/k *(2009)*

Sol

$$mgx = \frac{1}{2}kx^2$$

$$\frac{2mg}{k} = x$$

power

The rate at which work is done by a body or energy is transferred is called its power.

Power = Rate of doing work

$= \frac{\text{Work done}}{\text{Time taken}}$

If under a constant force F a body is displaced through a distance s in time t, then the power $P = \frac{W}{t} = \frac{F \cdot s}{t}$

But $\frac{s}{t} = v$, uniform velocity with which body is displaced.

$\therefore P = F \cdot v = F v \cos\theta$

where, θ is the smaller angle between F and v.

Power is a scalar quantity. Its SI unit is watt and its dimensional formula is $[M L^2 T^{-3}]$.

Its other units are kilowatt and horse power,

1 kilowatt = 1000 watt

1 horse power = 746 watt

$1 kW h = 3.6 \times 10^6 J$

Note :- $P = \frac{\frac{1}{2}mv^2 - \frac{1}{2}mu^2}{t}$

Instantaneous power, $P_{inst} = \frac{dW}{dt} = \bar{F} \cdot \frac{d\bar{r}}{dt}$

$P_{inst} = \bar{F} \cdot \bar{v}$

$P = \frac{mgh + \frac{1}{2}mv^2}{t}$

A body of mass 1 kg begins to move under the action of a time dependent force $\vec{F} = (2t\,\hat{i} + 3t^2\,\hat{j})$ N, where $\hat{i}$ and $\hat{j}$ are unit vectors along x and y axis. What power will be developed by the force at the time t?

(a) $(2t^3 + 3t^4)$ W (b) $(2t^3 + 3t^5)$ W

(c) $(2t^2 + 3t^3)$ W (d) $(2t^2 + 4t^4)$ W

(NEET-I 2016)

Sol $F = m\frac{dv}{dt}$

$$\int dt\,(2t\,i + 3t^2 j) = \int 1 \times dv$$

$$\int dv = 2i\int t\,dt + 3j\int t^2\,dt$$

$$V = 2i\,\frac{t^2}{2} + 3j\,\frac{t^3}{3}$$

$v = t^2 i + t^3 j$

$F = 2t i + 3t^2 j$

$P = \vec{F}\cdot\vec{v} =$

$= 2t^3 + 3t^5$

One coolie takes 1 minute to raise a suitcase through a height of 2 m but the second coolie takes 30 s to raise the same suitcase to the same height. The powers of two coolies are in the ratio

(a) 1 : 3 (b) 2 : 1 (c) 3 : 1 (d) 1 : 2

(Karnataka NEET 2013)

$$\frac{P_1}{P_2} = \frac{\frac{mgh}{t_1}}{\frac{mgh}{t_2}} = \frac{t_2}{t_1} = \frac{30}{60} = \frac{1}{2}$$

A particle of mass M, starting from rest, undergoes uniform acceleration. If the speed acquired in time T is V, the power delivered to the particle is

(a) $\frac{MV^2}{T}$ (b) $\frac{1}{2}\frac{MV^2}{T^2}$

(c) $\frac{MV^2}{T^2}$ (d) $\frac{1}{2}\frac{MV^2}{T}$ *(Mains 2010)*

$u = 0$

Sol $P = \frac{W}{t} = \frac{\frac{1}{2}MV^2 - \frac{1}{2}Mu^2}{T}$

$P = \frac{1}{2}\frac{MV^2}{T}$

Water falls from a height of 60 m at the rate of 15 kg/s to operate a turbine. The losses due to frictional forces are 10% of energy. How much power is generated by the turbine ? ($g = 10\ m/s^2$)

(a) 12.3 kW (b) 7.0 kW

(c) 8.1 kW (d) 10.2 kW *(2008)*

Sol $P = \frac{90\% \text{ of } mgh}{t}$

$P = \frac{90}{100} \times 15 \times 10 \times 60$

$P = 8100\ W$

(or)

$P = 8.1\ kW$

If $\vec{F} = (60\hat{i} + 15\hat{j} - 3\hat{k})$ N and $\vec{v} = (2\hat{i} - 4\hat{j} + 5\hat{k})$ m/s, then instantaneous power is

(a) 195 watt (b) 45 watt

(c) 75 watt (d) 100 watt *(2000)*

How much water a pump of 2 kW can raise in one minute to a height of 10 m ? (take $g = 10$ m/s^2)

(a) 1000 litres (b) 1200 litres

(c) 100 litres (d) 2000 litres *(1990)*

$P = \bar{F} \cdot \bar{V} = (60i + 15j - 3k) \cdot (2i - 4j + 5k)$

$= 120 - 60 - 15$

$= 45$ W

$P = 2000$ W

$t = 1$ min $= 60$ sec

$h = 10$ m

$m = ?$

$P = \frac{mgh}{t}$

$2000 = \frac{m \times 10 \times 10}{60}$

$1200 = m$

$d = \frac{m}{V}$

Good Qn.

Example 6.11 An elevator can carry a maximum load of 1800 kg (elevator + passengers) is moving up with a constant speed of 2 m s^{-1}. The frictional force opposing the motion is 4000 N. Determine the minimum power delivered by the motor to the elevator in watts as well as in horse power. (NCERT Qn).

(a) 50hp (b) 60hp (c) 59hp
(d) 69hp.

Sol

$m = 1800\ kg$

$v = 2\ ms^{-1}$

$f = 4000\ N.$

$P = F\,v$

$F_{downward} = mg + f$

$= 1800 \times 10 + 4000$

$= 22000\ N$

$P = 22000 \times 2$

$P = 44000\ W$

$P = \frac{44000}{746}$ ...

$P = 59\ hp$

1 Qn An automobile of mass m accelerates, starting from rest. The engine supplies constant power P, show that the velocity is given as a function of time by $v =$

a) $\left(\frac{2pt}{m}\right)^2$ (b) $\left(\frac{2pt}{m}\right)^{1/2}$

(c) $\left(\frac{2pt}{m}\right)^{-1/2}$ (d) $\left(\frac{2mt}{p}\right)^{1/2}$

Sol $P = \frac{\frac{1}{2}mv^2}{t}$

$\left(\frac{2pt}{m}\right)^{1/2} = v$

Gor^n

2 Qn A pump can take out 7200 kg of water per hour from a well 100 m deep. Calculate the power of the pump, assuming that its efficiency is 50%. (Take, $g = 10\ ms^{-2}$)

(a) 2KW (b) 4KW (c) 6KW (d) 8 KW.

o/p power $= \frac{mgh}{t} = \frac{7200 \times 10 \times 100}{3600}$

o/p power = 2000 W.

i/p power $= \frac{\text{o/p power}}{\eta} = \frac{2000}{\frac{50}{100}}$

i/p power $= \frac{2000 \times 100}{50} = 4000\ W = 4KW$

39n In unloading grain from the hold of a ship, an elevator lifts the grain through a distance of 12 m. Grain is discharged at the top of the elevator at a rate of 2 kg each second and the discharge speed of each grain particle is $3\ ms^{-1}$. Find the minimum horsepower of the motor that can elevate grain in this way. (Take, $g = 10\ ms^{-2}$)

a) 0.22 hp (b) 0.44 hp (c) 0.55 hp

(d) 0.33 hp

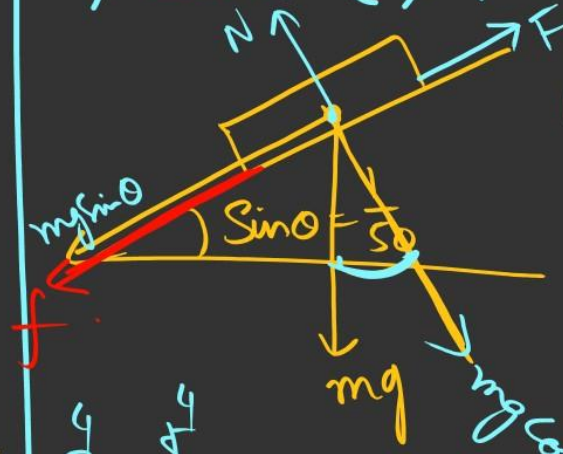
Sol $h = 12m$, $m = 2kg$, $V = 3ms^{-1}$.

$$P = \frac{mgh + \frac{1}{2}mv^2}{t} = \frac{2\times10\times12 + \frac{1}{2}(2)3^2}{1}$$

$$P = \frac{240+9}{1} = \frac{249}{746} = 0.33\ hp$$

40n A train of mass 2×10^5 kg has a constant speed of $20\ ms^{-1}$ up a hill inclined at $\theta = \sin^{-1}\left(\frac{1}{50}\right)$ to the horizontal when the engine is working at 8×10^5 W. Find the resistance to motion of the train. (Take, $g = 9.8\ ms^{-2}$)

a) 200 N (b) 400 N (c) 800 N (d) 1000 N.



under equilibrium Condition

$$F = f + mg\sin\theta$$

$$\frac{P}{V} = f + mg\sin\theta$$

$$\frac{8\times10^5}{20} = f + 2\times10^3\times9.8\times\frac{1}{50}$$

$$4\times10^4 = f + 39200$$

$$f = 40000 - 39200$$

$$f = 800\ N$$

Teaching from result producing faculties as a

- First benefits with senior lecturer of adult
- Top batch culture/ env/ system
- Exam pattern
- Real time doubt clarification
- Common exam system / syllabus
- Limited number of students in a class (40)
- Regular / weekly self assessments of exams
- Mentorship / Deen / tarbiyat
- Homely food / environment / family / Health
- Budget friendly

- Descriptive practice
- Supervision (Monitoring/tracking)
- Safe and secure environment
- Consistency in work / teaching
- Maximum / ample utilization of time & energy
- Least holidays schedule
- Getting QP/ DPP / Notes / Materials from alJ top institute of India
- No Boundaries in learnings
- Special support offline teaching by export faculties
- Phy & Che special support system
- Result analysis / comparisons with best students

Problems Faced by Students :

- 1. Deen aur Duniya
- 2. Challenges for Moving
  - Hostel culture
  - Food
  - Father / Mother/ Family
  - Home sleekness
  - Big class size (70-80)
  - Deen / Culture/ Values/ Family time
  - Health Issues
  - Unable to ask doubts
  - Travelling / Time management/
  - Most follow the regular schedule/ Money
  - Success ratio is very less
  - Regular problem with physics & chemistry
  - No tuition / Special support for tough subject

CHallenges in Remote areas/ Tier 3 Cities

- Market Potential is not Big
- Big Sharks wont invest in
- Unavailability of system process
- Result giving faculty won’t come to Adilabad
- Adilabad potential faculty migrate to cities in
  - better opportunity

ONLY ONLINE SYSTEM

- Lack of supervision / unable to follow system
- No proper mentorship / No regular exam
- Wastage of time / No peer learning
- No competition / isolate life
- Distractions are more
- Missing of social life & culture
- No friends/ no relatives
- No descriptive pattern practice
- Not able to perform in further life
- No tracks over progress
- No target

The Ideal is HYBRIDE MODEL

BENEFITS

Teaching from result producing faculties

students are as a first benchers

- Top batch culture / environment / system / exam pattern
- Real Time Doubt clarification
- Common exam system / syllabus
- Limited no of students in a class (40)
- Regular / weekly self estimate of exams
- Mentorship /Deen /Tarbiyat
- Homely culture
- friends and society

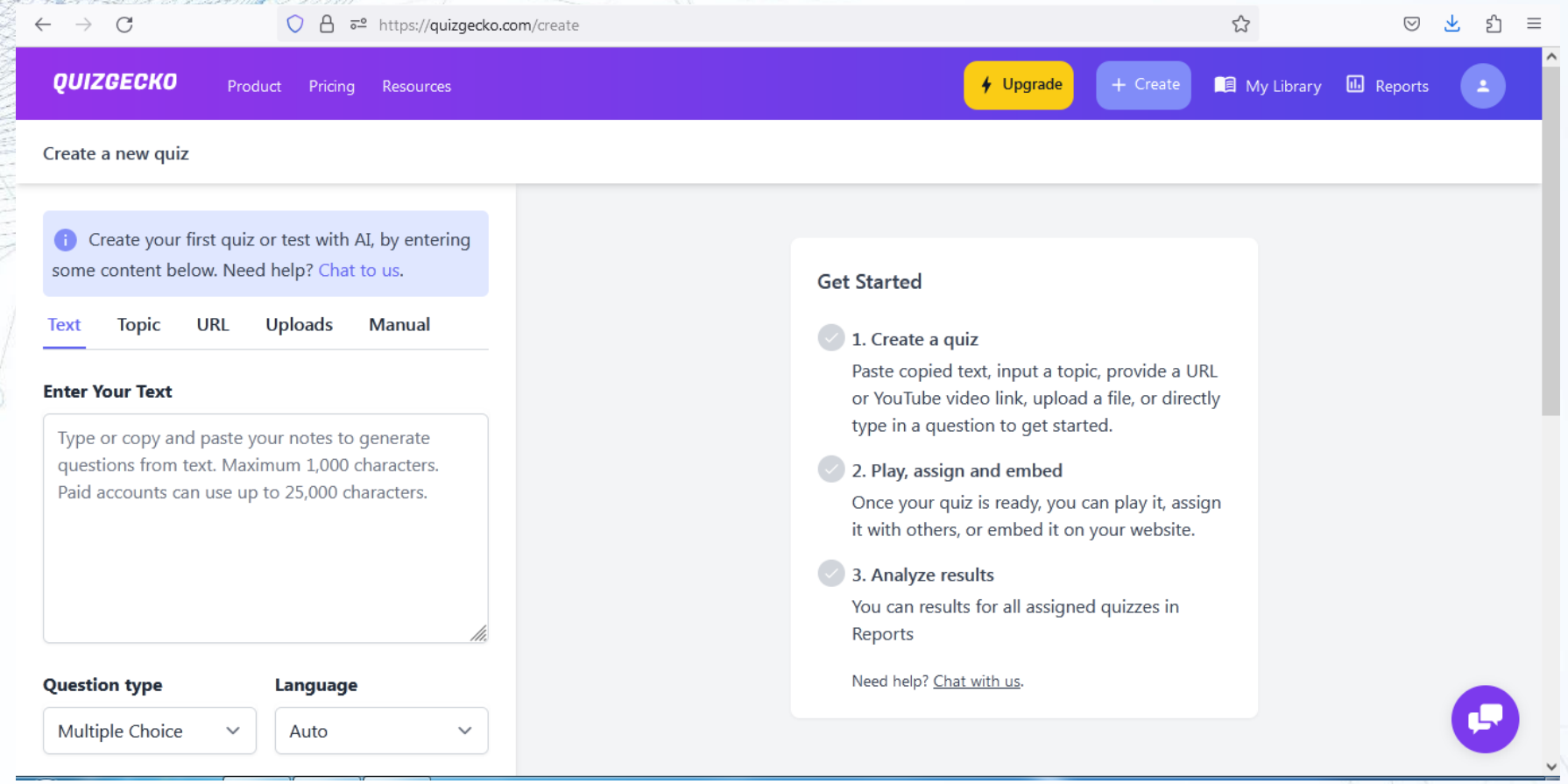
If you wants to collect notes about of this topic please click on URL (or) scan QR given below

https://drive.google.com/drive/folders/1pdxnv41zsJUpWdmbFD7mFuwCCNAVb-LI?usp=drive_link

ChatGPT

ChatGPT is a language model developed by OpenAI, built upon the GPT (Generative Pre-trained Transformer) architecture, specifically GPT-3.5. It is designed for natural language understanding and generation, making it capable of engaging in conversations, answering questions, and generating human-like text.

● Guizgecko > prep quiz / easy / medium



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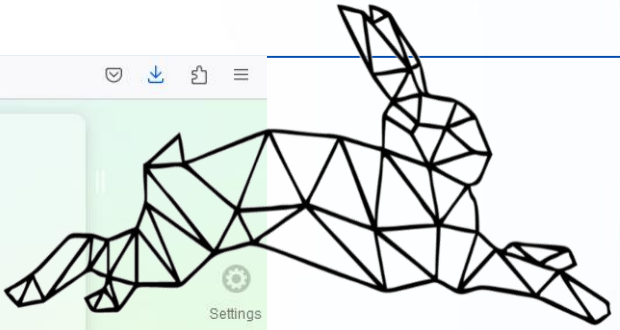
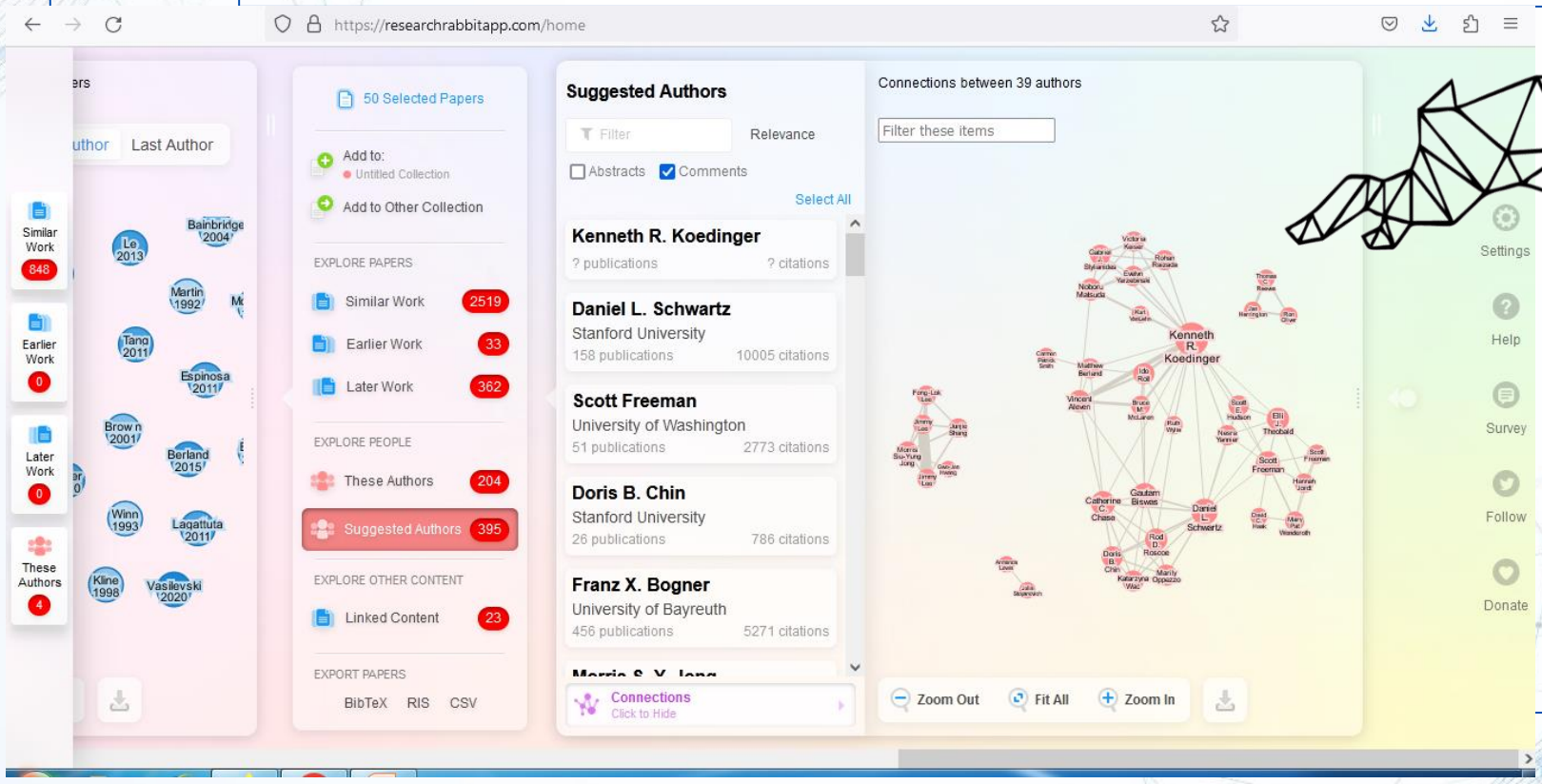
Research Rabbit > latest research in a particular

If "Research Rabbit" refers to a service, product, or organization related to research, it might be a good idea to check the latest online sources, such as official websites, reviews, or news articles, for the most up-to-date and accurate information. If "Research Rabbit" is a term used in a specific context or industry, providing more details could help me offer more relevant information based on the data available up to my last update.





• GradeScope:

If "Research Rabbit" refers to a service, product, or organization related to research, it might be a good idea to check the latest online sources, such as official websites, reviews, or news articles, for the most up-to-date and accurate information. If "Research Rabbit" is a term used in a specific context or industry, providing more details could help me offer more relevant information based on the data available up to my last update.

Education CoPilot:

If "Ed. Copilot" is a term related to a specific product, service, or technology, I recommend checking the latest online sources, official websites, or relevant news articles for the most recent and accurate information. If it's a more specific term within a certain context, providing additional details could help me offer more targeted information based on the data available up to my last update.

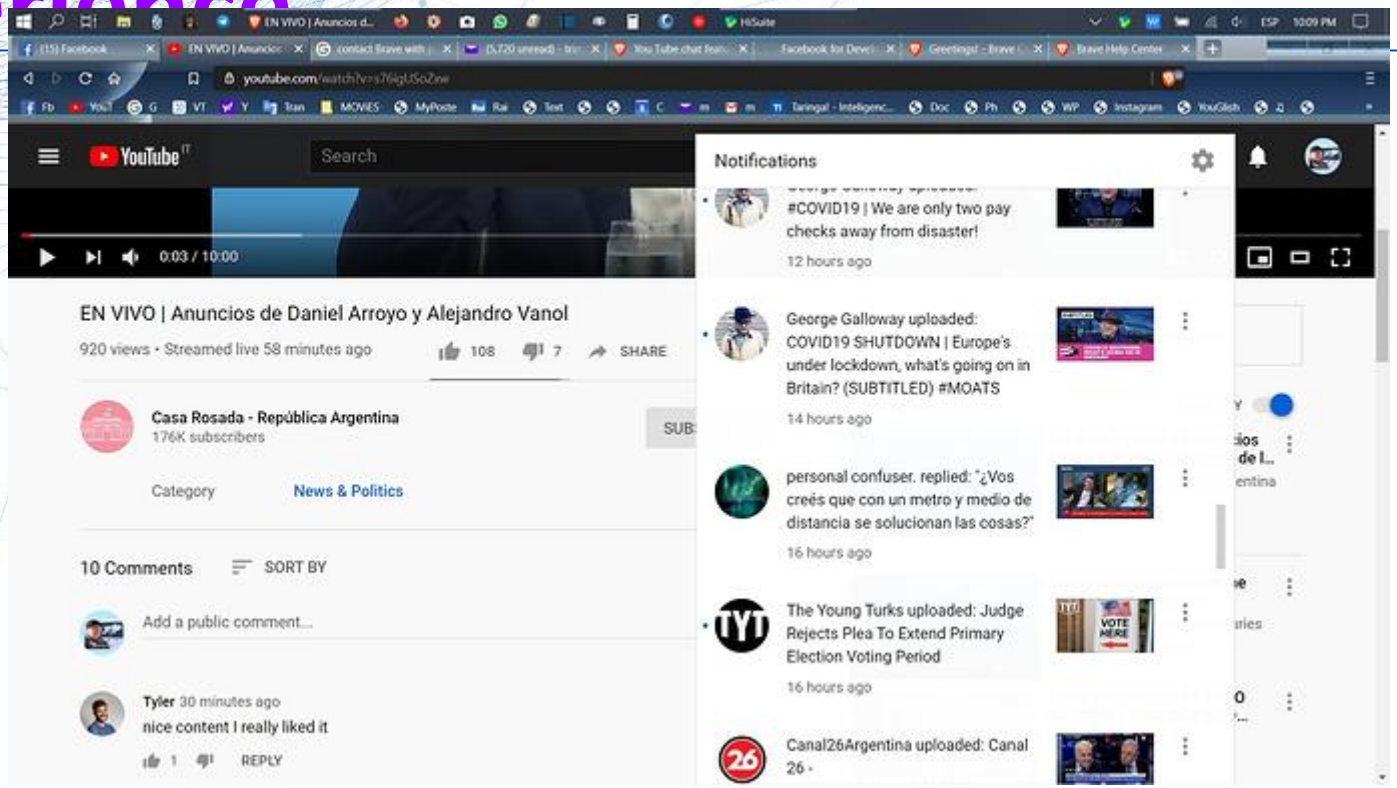
ReadCube Papers:

ReadCube Papers is a reference management tool designed for researchers, academics, and scientists. It helps users organize, discover, and access academic literature. Here are some key features and aspects of ReadCube Papers:

Opus. Pro:- AI Powered contact creation

"Opus Pro" primarily refers to Opus Pro, a software application developed by Digital Workshop. Opus Pro is a visual development tool designed for creating interactive multimedia and e-learning content without the need for extensive programming skills.

Chat youtube:- Youtube learning experience

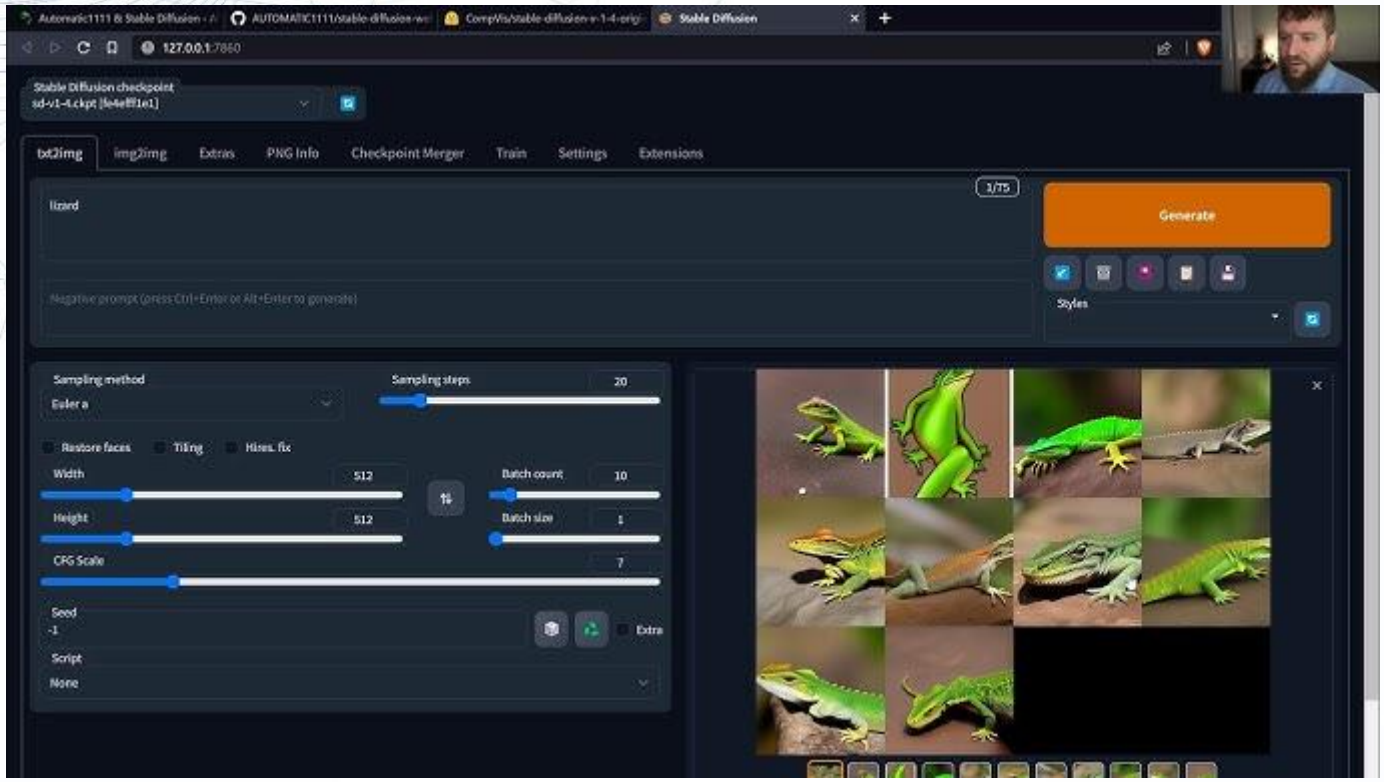


"Chat YouTube." However, I can provide information about YouTube and its features related to chat and interaction.

YouTube, as a popular video-sharing platform, incorporates various features to facilitate communication and interaction among users. Live chat is one such feature, especially during live streaming.

Stable Diffusion>

Focus on personals learning experience



"stable diffusion" is not associated with a specific concept or technology that is widely recognized in a general context. However, if it's a term used in a specific industry, field, or scientific discipline, additional context would be needed to provide a more accurate explanation.

- consider the ranking reading proficiency
- USA not #1
- not even in top 10
- it tied for 15th with iceland and poland
- out of all the places that do better than the US in reading how many of them have formal system to help their teachers improve? 11 out of 14,

  US got 24th in Science and 31st position in maths internationally

- Proper training for teachers on
- Preparing designs lessons / classes
- Usage of technology / Smartboard
- Teach supporting > PPT >Youtube >Google Search

- ChatGPT
- Quiz Gecho prep quiz / easy / medium
- Research rabbit > latest research in a particular
- Grandscop
- ed. copilot
- Readcube papers
- consensus:- Group project collaborate
- Elicit:- Classroom engagement
- Opus. pro:- Contact creation
- Chat youtube:- Youtube learning experience
- Stable diffusion> Focus on personals learning experience