



# ***A Roadmap to Competency-Based Assessment: PARAKH***

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# Why competency-based assessments?

## Transforming the culture of assessment

Continuous tracking of learning outcomes of each child

Board exams to be more flexible, with assessment of essential skills

Assessment to focus on core concepts, higher order and foundational skills

AI-based software to help track the progress of the Students to enable them to make optimal career choices.



National Assessment Centre will help in bringing greater synergy in board exams conducted by various Boards of Assessments

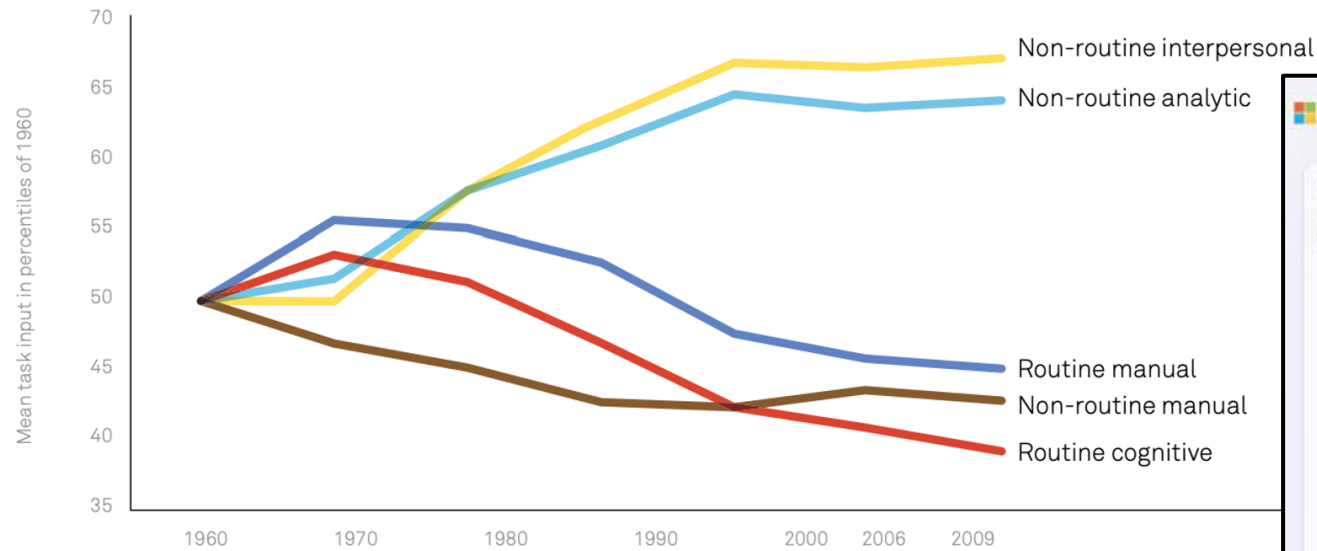
Self Assessment and Peer Assessment

1. The NEP advocates for it

2. Workplace skills have been shifting for decades in that direction

3. AI has only accelerated that trend

## The Nature of Work is changing with Non-routine Tasks on the Rise



Source: David H. Autor, Brendan Price. "The Changing Task Composition of the US Labor Market: An Update of Autor, Levy, and Murane (2003)". MIT Mimeo-graph, Massachusetts Institute of Technology (2013).

The screenshot shows a search result on Microsoft Bing. The search query is "How will Generative AI technologies change the world". The result includes a summary paragraph and a list of 8 areas where generative AI will change the world in the next 3-5 years:

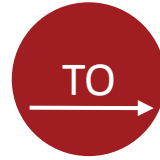
1. Vast digital content in the metaverse and NFT space
2. Music and songwriting
3. Autonomous vehicles
4. Malicious hacking
5. Drug discovery
6. New materials and chemical synthesis
7. Automatic electronics design
8. AGI renaissance<sup>1</sup>

Below the list, there is a paragraph stating: "Generative AI technology will cause a profound disruption to industries and may ultimately aid in solving some of the most complex problems facing the world today<sup>2</sup>. Three industries that have the highest potential for growth in the near term are consumer, finance, and health care<sup>2</sup>."

# What are competency-based questions and how are they different?

1

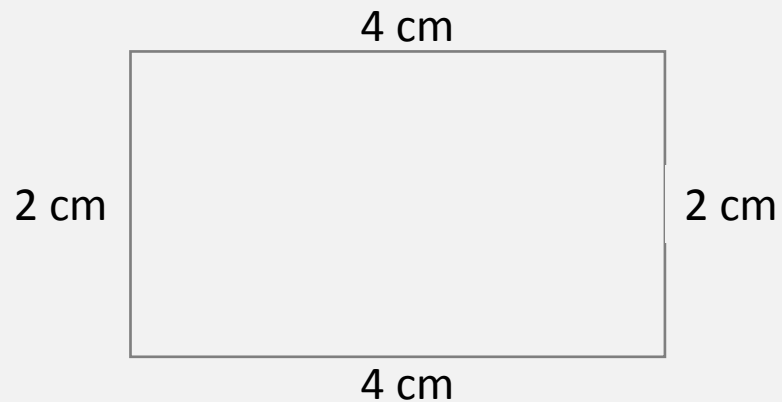
The gravitational pull on the Moon is \_\_\_\_\_ of that of Earth.



You're standing on the moon holding a pen, and you let it go. What will happen to the pen?

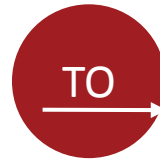
2

What is the perimeter of this rectangle?

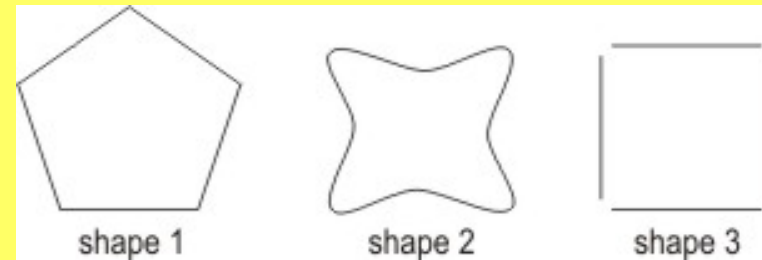


Answer:

78% answered correctly



Which of these shape(s) has/have a perimeter?



39.8% answered only shapes 1 and 2

34.2% only shape 1

16.4% answered only shapes 1 and 3

# Our questioning has to change from typical recall questions to ones testing understanding

Prove that  $\sqrt{3}$  is an irrational number.

OR

Find the largest number which on dividing 1251, 9377 and 15628 leaves remainders 1, 2 and 3 respectively.

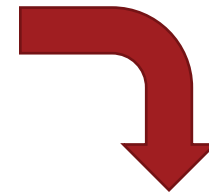
3. Write a letter in 100-120 words, to the Editor of The Hindu, Chennai discussing in detail the advantages and disadvantages of ban on crackers. You are Anu/Anuj, 112, Lawrence Road, Kochi. 8

30. (a) An electric bulb is rated at 200 V; 100 W. What is its resistance?

(b) Calculate the energy consumed by 3 such bulbs if they glow continuously for 10 hours for complete month of November.

Define atomic size. Give its unit of measurement. In a table what trend is observed in the atomic radius in a group and why is it so?

Actual questions today

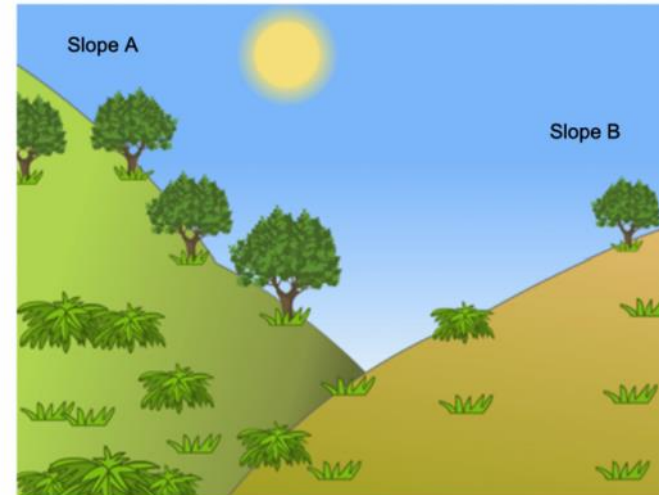


## SLOPE-FACE INVESTIGATION

A group of students notices a dramatic difference in the vegetation on the two slopes of a valley: the vegetation is much greener and more abundant on slope A than on slope B. This difference is shown in the illustration on the right.

The students investigate why the vegetation on the slopes is so different from one slope to the other. As part of this investigation, the students measure three environmental factors over a given period of time:

- **Solar radiation:** how much sunlight falls on a given location
- **Soil moisture:** how wet the soil is in a given location
- **Rainfall:** how much rain falls on a given location



Refer to "Data Analysis" on the right. Click on a choice and then type an explanation to answer the question.

Two students disagree about why there is a difference in soil moisture between the two slopes.

- Student 1 thinks that the difference in soil moisture is due to a difference in solar radiation on the two slopes.
- Student 2 thinks that the difference in soil moisture is due to a difference in rainfall on the two slopes.

According to the data, which student is correct?

- Student 1  
 Student 2

Explain your answer.

Actual question from PISA

# Used thoughtfully, technology can help the shift to competency-based assessment

ASSET English - Grade 9 Time left: 65 min Ques. left: 59/60 [Nishchal Shukla]

Question Panel 50 - 54 Complete the passage by selecting appropriate phrases from the drop-downs: Mark

**Segway Human Transporter**

Dean Kamen's mysterious invention,  as to what it was - is now known as the Segway Human Transporter, the first self-balancing, electric-powered transportation machine. The Segway Human Transporter is a personal transport device that uses five **gyroscopes**\* . It was unveiled to the public on December 3, 2001 in New York (, *Good Morning America*). The first Segway Human Transporter used no brakes and did a nifty 12 mph. The speed and direction  shifting weight and a manual turning mechanism .

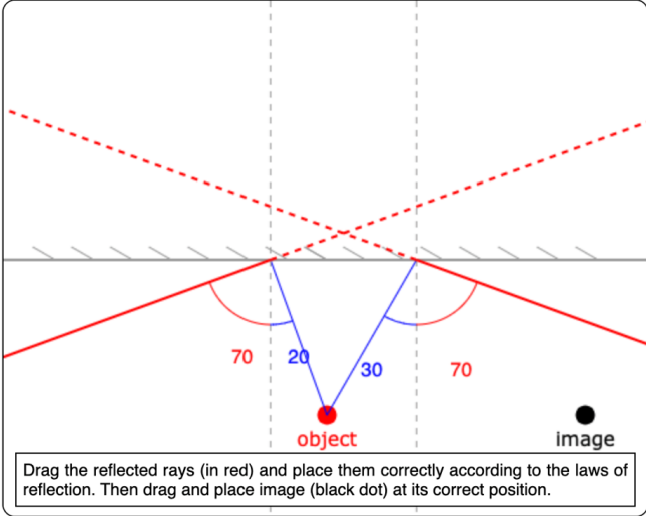
Select  
in one of the handlebar  
on one of the handlebars  
at one of the handlebar  
for one of the handlebars

Unanswered  
 Answered  
 Marked for review

ASSET English - Grade 9 Time left: 65 min Ques. left: 59/60 [Nishchal Shukla]

Question Panel 50 An image is formed due to reflection from a plane mirror when all the rays falling on the mirror from a point on an object seem to come out from a point after reflection. Mark

Follow the instructions in the following figure.



Unanswered  
 Answered  
 Marked for review

End Test Prev Question

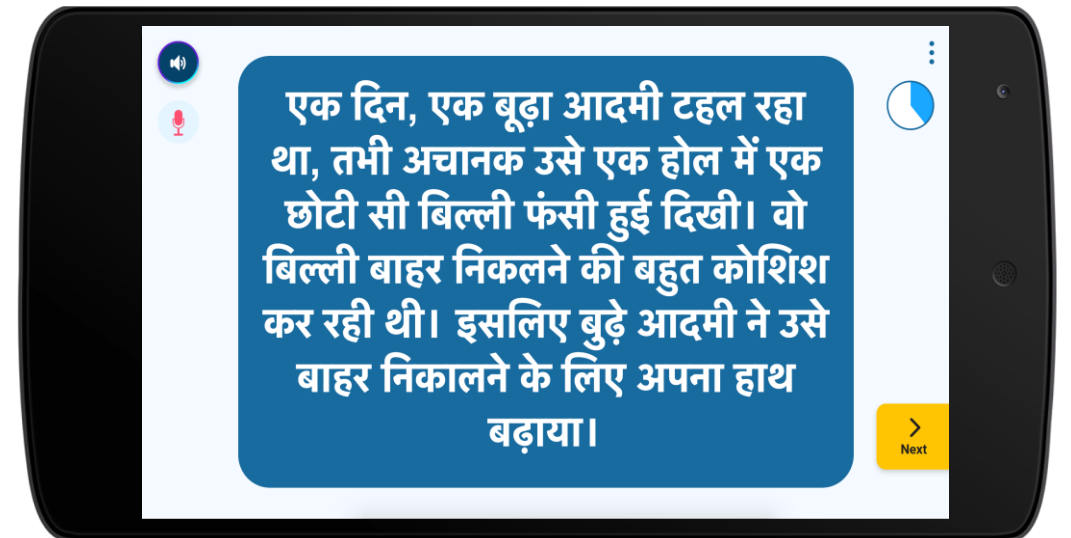
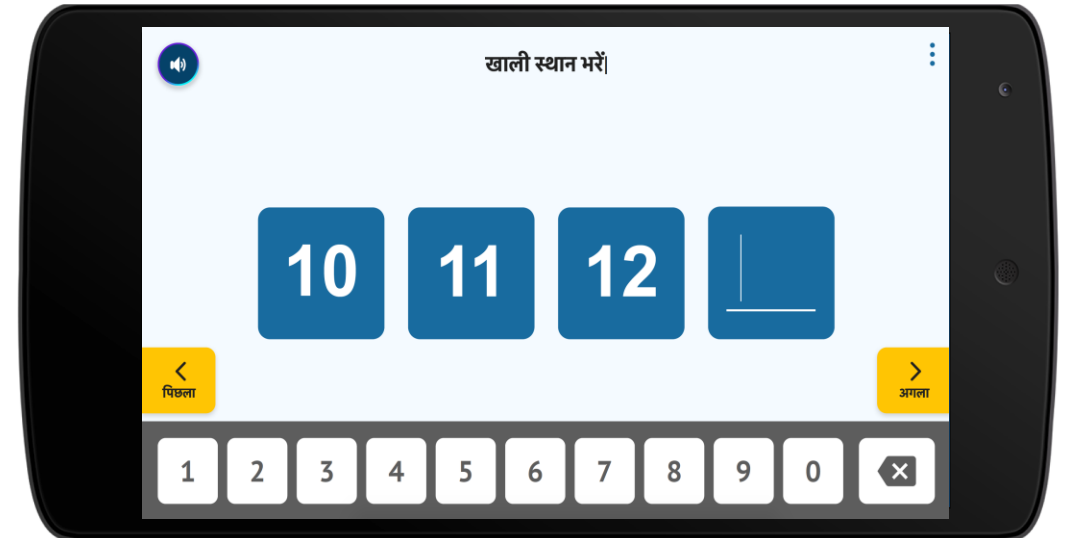
Shown here is a video that shows a plant bending towards the light. The video was made by taking pictures of the plant after every 15 minutes over a period of 3 hours.



What can be said based on this?



# Competency-based assessments are relevant for all levels, including FLN



# SAFAL (by CBSE): To prepare students and teachers for competency based assessments from class 5 itself



NUDGE SYSTEM TOWARDS  
COMPETENCY-BASED  
LEARNING



MEASURE SCHOOL  
PERFORMANCE ON KEY  
COMPETENCIES



IDENTIFY AREAS OF  
ACADEMIC INTERVENTION  
FOR SUPPORT/  
MANAGEMENT

**Structured Assessment for Analyzing Learning levels (SAFAL)** aims to support the move towards competency-based education.

It will provide diagnostic information about students' learning to schools.

Source: SAFAL Handbook, CBSE

# Board exams are also changing to competency based assessments

## Case-III :

A compound microscope is an instrument which consists of two lenses  $L_1$  and  $L_2$ . The lens  $L_1$  called objective, forms a real, inverted and magnified image of the given object. This serves as the object for the second lens  $L_2$ ; the eye piece. The eye piece functions like a simple microscope or magnifier. It produces the final image, which is inverted with respect to the original object, enlarged and virtual.

57. What types of lenses must be  $L_1$  and  $L_2$  ?
- (a) Both concave (b) Both convex  
(c)  $L_1$  – concave and  $L_2$  – convex (d)  $L_1$  – convex and  $L_2$  – concave
58. What is the value and sign of magnification (according to the new Cartesian sign convention) of the image formed by  $L_1$  ?
- (a) Value = Less than 1 and Sign = Positive  
(b) Value = More than 1 and Sign = Positive  
(c) Value = Less than 1 and Sign = Negative  
(d) Value = More than 1 and Sign = Negative

Board Question Paper – 2021



The above images are that of a specialized slide projector. Slides are small transparencies mounted in sturdy frames ideally suited to magnification and projection, since they have a very high resolution and a high image quality. There is a tray where the slides are to be put into a particular orientation so that the viewers can see the enlarged erect images of the transparent slides. This means that the slides will have to be inserted upside down in the projector tray.

To show her students the images of insects that she investigated in the lab, Mrs. Iyer brought a slide projector. Her slide projector produced a 500 times enlarged and inverted image of a slide on a screen 10 m away.

- (a) Based on the text and data given in the above paragraph, what kind of lens must the slide projector have?
- (b) If  $v$  is the symbol used for image distance and  $u$  for object distance then with one reason state what will be the sign for  $\frac{v}{u}$  in the given case?
- (c) A slide projector has a convex lens with a focal length of 20 cm. The slide is placed upside down 21 cm from the lens. How far away should the screen be placed from the slide projector's lens so that the slide is in focus?

**OR**

- (c) When a slide is placed 15 cm behind the lens in the projector, an image is formed 3 m in front of the lens. If the focal length of the lens is 14 cm, draw a ray diagram to show image formation. (not to scale)

Board Question Paper - 2011

Sample Question Paper – 2022-23

24. (a) If the image formed by a lens is diminished in size and erect, for all positions of the object, what type of lens is it ?
- (b) Name the point on the lens through which a ray of light passes undeviated.



## Through case-based questions, authentic real-life contexts help build competencies

Here are a few images (not to scale) of some clay dolls of Krishnanagar.



**Doll-1**



**Doll-2**



**Doll-3**



**Doll-4**

The ratio of diameters of red spherical apples in Doll-1 to that of spherical oranges in Doll-2 is 2:3. In Doll-3, male doll of blue colour has cylindrical body and a spherical head. The spherical head touches the cylindrical body. The radius of both the spherical head and the cylindrical body is 3cm and the height of the cylindrical body is 8cm. Based on the above information answer the following questions:

- i) What is the ratio of the surface areas of red spherical apples in Doll-1 to that of spherical oranges in Doll-2.?
- ii) The blue doll of Doll-3 is melted and its clay is used to make the cylindrical drum of Doll-4. If the radius of the drum is also 3cm, find the height of the drum.

# PARAKH can serve as a technical assessment expert to help the shift to competency based assessments and more

## National Assessments Centre (PARAKH)

Setting up National Assessment Centre, PARAKH (Performance Assessment, Review, and Analysis of Knowledge for Holistic Development) under MoE

Set standards for all recognized school boards of India



Monitor achievement of learning outcomes in the country



Guide the State Achievement Survey (SAS) and undertaking the National Achievement Survey (NAS)

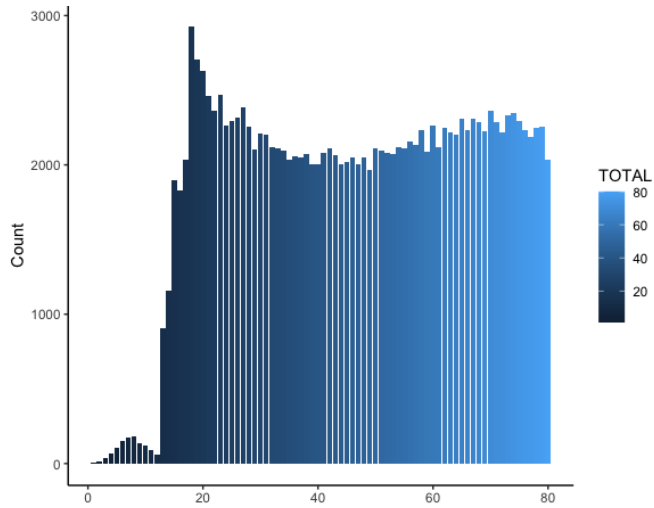


Helping school boards to shift their assessment patterns to the skill requirements of the 21<sup>st</sup> century

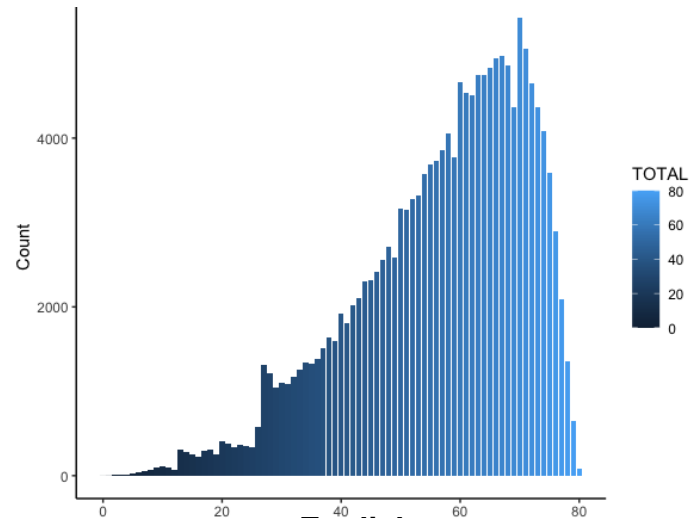


# Some current issues with mark distributions and grade inflation

**Current**

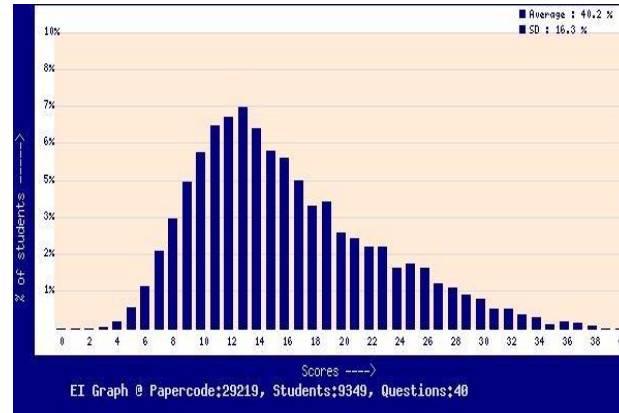


**Maths**  
Score Distribution – one region

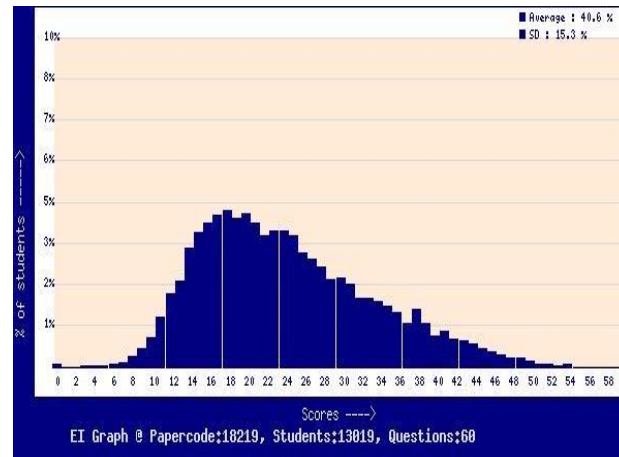


**English**  
Score Distribution – one region

**Desirable**

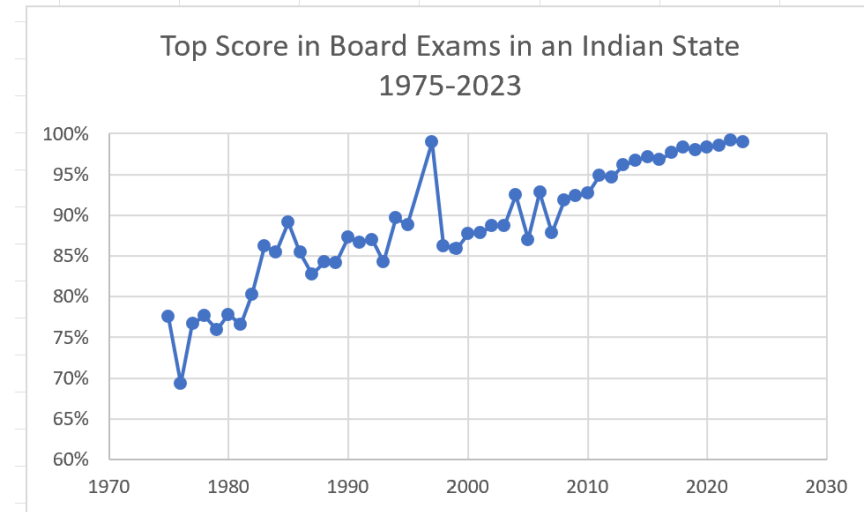


**Maths**  
Score Distribution (desired)

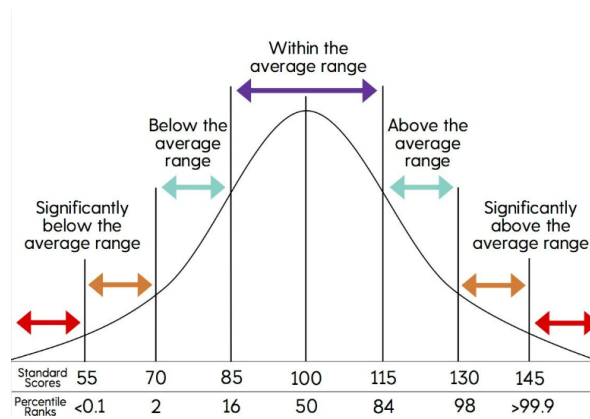


**English**  
Score Distribution – (desired)

**Grade inflation in Board Exam Scores**



# Some Learnings from International Experience



## Use of Scale Scores and Percentiles

## Empaneling independent External Assessment agencies

Table B: Benchmark tests available according to the curriculum

Curriculum	Recommended assessment (choose one from this list)	Targeted Grades	Number of students
UK curriculum schools	<ul style="list-style-type: none"> <li>GL (PTE, PTS and PTM)</li> <li>ACER (ISA)</li> </ul>	Years 4, 5, 6, 7, 8, 9 and 10 (Grades 3, 4, 5, 6, 7, 8 and 9)	All students in the targeted grades
US curriculum schools	<ul style="list-style-type: none"> <li>NWEA MAP</li> <li>ASSET</li> <li>ACER (ISA)</li> </ul>	Grades 3, 4, 5, 6, 7, 8 and 9	
Indian curriculum schools (CBSE, CISCE, KSB)	<ul style="list-style-type: none"> <li>ASSET</li> <li>ACER (ISA)</li> </ul>	Grades 3, 4, 5, 6, 7, 8, and 9	
MoE private schools	<ul style="list-style-type: none"> <li>**EmsAT for all available grades and subjects.</li> <li>IBT (Arabic version) for all remaining available grades.</li> </ul>	More details about available grades for EmsAT will be provided by MoE	
IB curriculum schools	<ul style="list-style-type: none"> <li>ACER (ISA)</li> <li>NWEA MAP</li> <li>GL (PTE, PTS, PTM)</li> <li>ASSET</li> </ul>	Grades 3, 4, 5, 6, 7, 8, and 9	
Others: Pakistani, Canadian, Philippines and all other schools with English language of instruction.	<ul style="list-style-type: none"> <li>ACER (ISA)</li> <li>NWEA MAP</li> <li>GL (PTE, PTS, PTM)</li> <li>ASSET</li> </ul>	Grades 3, 4, 5, 6, 7, 8, and 9	



## Parent Advocacy and Sessions



# Conclusions

01

The world around us and the world of work are changing – our assessments have to keep pace and become competency-based so our children are ready for tomorrow

02

Competency-based questions check for understanding and make students think. Competency based assessments are challenging while being fair by having questions at all levels of difficulty

03

Initiatives like SAFAL and use of technology even at the FLN level can help prepare students and teachers right from the lower classes. Our Board Exams have started changing with Boards expressing commitment to competency-based assessments

04

PARAKH will help with all these areas including building assessment capacity through the system as well as addressing standardisation across Boards and issues like grade inflation.

05

Globally boards focus a lot on creating such good quality questions, use of scale scores and percentiles, participation in tests like PISA and other independent assessments, and doing parent advocacy and education sessions



# Thank You

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