



آغا خان یونیورسٹی ایگزامینیشن بورڈ
AGA KHAN UNIVERSITY EXAMINATION BOARD

Pacing Guide for Teachers

PHYSICS

Grade XI

Theory

Number of weeks: 28

Number of periods per week: 5

Key Textbook: Punjab Curriculum and Textbook Board Grade XI Physics

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Institution(s): Aga Khan Higher Secondary School, Karachi and Habib Girls' Higher Secondary School, Karachi

Topic

Total Periods

1. Measurements

10

Sub-Topic	Range of SLOs	Periods (40 mins)
1.1 Scope of Physics	1.1.1	1
1.2 International System (SI) Units	1.2.1-1.2.3	1
1.3 Errors and Uncertainty	1.3.1-1.3.2	2
1.4 Precision and Accuracy	1.4.1-1.4.2	1.5
1.5 Significant Figures	1.5.1-1.5.2	1.5
1.6 Dimensions	1.6.1-1.6.3	3

Web Resources

<https://circuitglobe.com/accuracy-and-precision.html>

<https://thefactfactor.com/tag/dimensions-of-physical-quantity/>

Suggested Activities and/or Formative Assessment

Activity 1:

Measured values activity that includes uncertainty.

<https://serc.carleton.edu/sp/library/uncertainty/examples/48732.html>

Activity 2

Prepare a set of CRQ level questions in the form of chits, matching the number of questions to the total number of students in the class. Randomly distribute these chits among the students and instruct them to answer the questions in their own copies. After collecting the answers, assess and grade each student's response. To ensure the reusability of the questions for the following year, strictly prohibit students from writing anything on the chits during the exercise.

Further Resources

For additional resources related to teaching, learning and formative assessments, please refer to Learn Smart Classroom by Knowledge Platform:

<https://akueb.knowledgeplatform.com/login>



Topic

Total Periods

2. Vectors and Equilibrium

12

Sub-Topic	Range of SLOs	Periods (40 mins)
2.1 Cartesian Coordinate System 2.2 Addition of Vectors by Head to Tail Rule	2.1.1-2.2.3	2
2.3 Addition of Vectors by Rectangular Component Method	2.3.1	2
2.4 Scalar Product of Two Vectors	2.4.1-2.4.3	2
2.5 Vector Product of Two Vectors	2.5.1-2.5.3	2
2.6 Torque	2.6.1-2.6.2	1
2.7 Equilibrium of Forces	2.7.1-2.7.2	3

Web Resources

<https://openstax.org/books/university-physics-volume-1/pages/2-1-scalars-and-vectors>

<https://openstax.org/books/university-physics-volume-1/pages/2-2-coordinate-systems-and-components-of-a-vector>

<https://openstax.org/books/university-physics-volume-1/pages/2-4-products-of-vectors>

Suggested Activities and/or Formative Assessment

Activity 1

Instruct the students to come up with one or two CRQ level questions either through their own thinking or by conducting research. Then, randomly distribute these questions among the students in the class. They can choose to solve the questions either individually or in groups during the class session. This activity encourages critical thinking and collaboration among the students while engaging them in answering challenging questions.

Activity 2

Few sample questions for assessments after completion of topics.

<https://www.slideshare.net/RamC3/physics-notes-solved-numerical-of-physics-first-year>

Further Resources

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Topic

Total Periods

3. Motion and Force

13

Sub-Topic	Range of SLOs	Periods (40 mins)
3.1 Displacement	3.1.1	0.5
3.2 Velocity	3.2.1-3.2.5	3
3.3 Acceleration	3.3.1	2
3.4 Laws of Motion	3.4.1	1.5
3.5 Force, Momentum, and Impulse	3.5.1-3.5.7	3
3.6 Projectile	3.6.1-3.6.5	3

Web Resources

<https://openstax.org/books/university-physics-volume-1/pages/3-4-motion-with-constant-acceleration>

<https://www.cyberphysics.co.uk/topics/forces/momentum.htm>

<https://openstax.org/books/university-physics-volume-1/pages/4-3-projectile-motion>

Suggested Activities and/or Formative Assessment

Activity 1

Problem solving based Simulation Activity.

<https://phet.colorado.edu/en/simulations/projectile-motion>

Activity 2

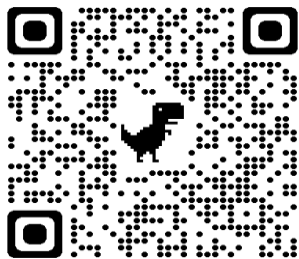
Few sample questions for assessments after completion of topics.

<https://www.slideshare.net/RamC3/physics-notes-solved-numerical-of-physics-first-year>

Further Resources

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Topic

Total Periods

4. Work, Power and Energy

16

Sub-Topic	Range of SLOs	Periods (40 mins)
4.1 Work	4.1.1-4.1.5	2
4.2 Work Done in a Gravitational Field	4.2.1	2
4.3 Power	4.3.1-4.3.3	2
4.4 Energy	4.4.1-4.4.3	1
4.5 Work-Energy Relation	4.5.1	2
4.6 Absolute Gravitational Energy	4.6.1-4.6.2	2
4.7 Escape Velocity	4.7.1-4.7.3	2
4.8 Conservation of Energy	4.8.1-4.8.2	2
4.9 Types of Energy Sources	4.9.1-4.9.2	1

Web Resources

<https://openstax.org/books/university-physics-volume-1/pages/8-3-conservation-of-energy>

<https://www.cyberphysics.co.uk/topics/energy/sources.htm>

Suggested Activities and/or Formative Assessment

Activity 1

Ask students to use this simulator and give tasks to accomplish about energy, types and conservation.

https://javalab.org/en/mechanical_energy_en/

Activity 2

Ask students to inculcate their ICT skills to design some quizzes e.g., Google form, Wiser, Quizzes, ProProfs etc. for some assigned topics.

Further Resources

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Topic

Total Periods

5. Circular Motion

13

Sub-Topic	Range of SLOs	Periods (40 mins)
5.1 Angular Motion	5.1.1-5.1.2	1.5
5.2 Centripetal Force and Centripetal Acceleration	5.2.1-5.2.3	2
5.3 Moment of Inertia	5.3.1	0.5
5.4 Angular Momentum	5.4.1-5.4.2	2
5.5 Rotational Kinetic Energy	5.5.1-5.5.2	2
5.6 Artificial Satellites and Weightlessness	5.6.1-5.6.6	3
5.7 Orbital Velocity	5.7.1-5.7.2	2

Web Resources

<https://openstax.org/books/university-physics-volume-1/pages/4-4-uniform-circular-motion>

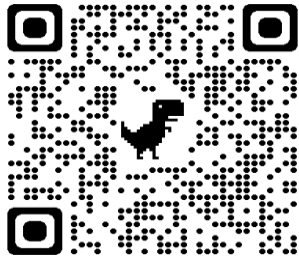
<https://openstax.org/books/university-physics-volume-1/pages/11-3-conservation-of-angular-momentum>

<https://openstax.org/books/university-physics-volume-1/pages/6-3-centripetal-force>

Further Resources

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FOR ACADEMIC YEAR 2023 AND ONWARDS

Topic

Total Periods

6. Fluid Dynamics

11

Sub-Topic	Range of SLOs	Periods (40 mins)
6.1 Streamline and Turbulent Flow	6.1.1-6.1.2	1
6.2 Equation of Continuity	6.2.1-6.2.3	2
6.3 Bernoulli's Equation	6.3.1-6.3.3	4
6.4 Viscous Fluids and Fluid Friction	6.4.1-6.4.3	2
6.5 Fluid Friction and Terminal Velocity	6.5.1-6.5.5	2

Web Resources

https://www.princeton.edu/~asmits/Bicycle_web/continuity.html

<https://www.youtube.com/watch?v=wykn-JTnacE>

<https://www.youtube.com/watch?v=bC8v6hIXnSk&t=13s>

<https://www.youtube.com/watch?v=p0IZsfzDS4s>

Further Resources

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Topic

Total Periods

7. Oscillations

12

Sub-Topic	Range of SLOs	Periods (40 mins)
7.1 Simple Harmonic Motion (SHM)	7.1.1	1
7.2 Uniform Circular Motion and SHM	7.2.1-7.2.2	2
7.3 Phase Angle	7.3.1	1
7.4 A Horizontal Mass-Spring System	7.4.1	1
7.5 Simple Pendulum	7.5.1-7.5.3	2
7.6 Energy Conservation in SHM	7.6.1	2
7.7 Free and Forced Oscillation	7.7.1	1
7.8 Resonance	7.8.1	1
7.9 Damped Oscillations	7.9.1-7.9.2	1

Web Resources

<https://studylib.net/doc/10455461/simple-harmonic-motion--shm-kx-mv>

<https://www.youtube.com/watch?v=5H8aRCyEGnU>

Suggested Activities and/or Formative Assessment

Activity 1

Bring pendulum apparatus in the classroom and ask students to measure its time period. Also use this apparatus to show the factors affecting time period of pendulum.

Activity 2

Assign any of the topics to each student or in groups and ask them to present in front of classmates. (It will be more productive if students use presentation making tools e.g., PowerPoint, Canvas etc. for this purpose)".

Further Resources

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Topic

Total Periods

8. Waves

15

Sub-Topic	Range of SLOs	Periods (40 mins)
8.1 Wave Motion	8.1.1-8.1.6	2
8.2 Speed of Sound	8.2.1-8.2.5	4
8.3 Superposition of Waves	8.3.1-8.3.3	2
8.4 Stationary Waves	8.4.1-8.4.6	3
8.5 Doppler's Effect	8.5.1-8.5.5	4

Web Resources

https://www.youtube.com/watch?v=UDyhcxR_90

<https://www.youtube.com/watch?v=yd-G6KYwzvA>

https://www.youtube.com/watch?v=-_xZZt99MzY

<http://www.sengpielaudio.com/calculator-airpressure.htm>

<https://www.youtube.com/watch?v=CAe3IkYnKt8>

https://www.youtube.com/watch?v=_S7-PDF6Vzc

Standing Waves Demonstration

<https://www.youtube.com/watch?v=5-0U4-Sd4EE>

Standing waves in closed pipe

<https://www.youtube.com/watch?v=h4OnBYrbCjY>

Suggested Activities and/or Formative Assessment

Activity 1

Divide some topics among students in groups and ask them to discuss and make notes. Now give them some tasks on the relevant topics to conclude their understanding.

Activity 2

Few sample questions for assessments.

<https://www.slideshare.net/RamC3/physics-notes-solved-numerical-of-physics-first-year>

Further Resources

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Topic

Total Periods

9. Physical Optics

17

Sub-Topic	Range of SLOs	Periods (40 mins)
9.1 Nature of Light	9.1.1-9.1.4	2
9.2 Interference of Light	9.2.1-9.2.5	3
9.3 Interference in Thin Films	9.3.1	1.5
9.4 Newton's Ring	9.4.1	1.5
9.5 Michelson's Interferometer	9.5.1	2
9.6 Diffraction of Light	9.6.1 - 9.6.3	2
9.7 Bragg's Law	9.7.1-9.7.4	3
9.8 Polarisation	9.8.1-9.8.4	2

Web Resources

<https://www.youtube.com/watch?v=cwlmCx83K5I>

<https://www.youtube.com/watch?v=-mNQW5OShMA>

Suggested Activities and/or Formative Assessment

Activity 1

Few sample questions for assessments.

<https://www.slideshare.net/RamC3/physics-notes-solved-numerical-of-physics-first-year>

Further Resources

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FOR ACADEMIC YEAR 2023 AND ONWARDS

Topic

Total Periods

10. Thermodynamics

21

Sub-Topic	Range of SLOs	Periods (40 mins)
10.1 Kinetic Theory of Gases	10.1.1-10.1.3	2.5
10.2 Gas Laws	10.2.1	1.5
10.3 Internal Energy	10.3.1	1
10.4 Work and Heat	10.4.1-10.4.3	2
10.5 Thermodynamics	10.5.1-10.5.5	3
10.6 Specific and Molar Specific Heat of Gases	10.6.1-10.6.3	2
10.7 Reversible and Irreversible Process	10.7.1	1
10.8 Second Law of Thermodynamics	10.8.1	1
10.9 Carnot Engine	10.9.1-10.9.3	3
10.10 Refrigerator	10.10.1-10.10.2	2

10.11 Entropy	10.11.1-10.11.4	2
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Web Resources

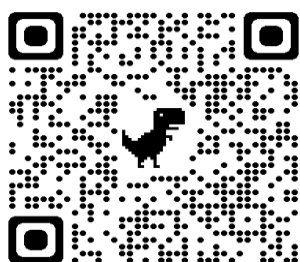
https://chem.libretexts.org/Under_Construction/Purgatory/Kinetic_Theory_of_Gases

<https://www.ck12.org/section/second-law-of-thermodynamics-::of::-thermodynamics-::of::-ck-12-physics-intermediate-teachers-edition/>

Further Resources

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FOR ACADEMIC YEAR 2023 AND ONWARDS

Note: This teacher-led pacing guide has been developed for AKU-EB affiliated schools to facilitate them by

- ensuring smooth transition of a school's academic year.
- ensuring curricular continuity in schools.
- predicting the time and pace of syllabi implementation.

This document also contains **suggested activities and/or formative assessments** that may enhance the learning experience. Please note that these activities are meant to serve as suggestions. As educators, you have the flexibility and autonomy to adapt and modify them to best suit the needs of your students and the dynamics of your classroom.

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FOR ACADEMIC YEAR 2023 AND ONWARDS