EVIDENCES PORTFOLIO
EXTRAORDINARY
2nd OPPORTUNITY

<u>MECHANICS AND ENVIROMENT</u>

Student's name:_____

_____

Roll number: _____ **Date**: _____/ _____/ 2022

Teacher: _____ **Group**: _____

The current portfolio is part of the 50% of the evaluation. This part of the grade will be obtained only if meet the requirements:

1. Follow the **instructions provided by the teacher** for the filled of this portfolio.
2. Put your **complete identification data.**
3. **Upload and send** this portfolio **in PDF format**, the **day** and **time** in **which the teacher assigns** on the **Assignment section** of the current **team** corresponding to the **subject in MS Teams**, where the teacher will review.
4. **PLEASE ADD YOUR FULL NAME ON EACH SHEET.**

Specific academic guideline

The current portfolio is part of the 50% of the evaluation. This part of the grade will be obtained only if meet the requirements.

1. Put your complete identification data.

2. The portfolio answers should be handwritten with blue ink, remember that the procedures must be complete.

3. Take a photograph of each sheet, to create a WORD document for later conversion.

STAGE 1: KINEMATICS: ONE-DIMENSIONAL MOTION

SOLVE THE FOLLOWING QUESTIONS AND PROBLEMS BY CHOOSING THE CORRECT OPTION. <u>PROCEDURES ARE NECESSARY TO WRITE IT IN EACH PROBLEM OR ELSE IT WILL NOT BE VALIDADED.</u>

1. Physical quantities that remain completely defined through a number and through a measurement unit.
a) Physical quantities
b) Scalar quantities
c) Vector quantities
d) Chemical quantities

2. Physical quantities that have a numeric value, direction and sense.
a) Physical quantities
b) Scalar quantities
c) Vector quantities
d) Chemical quantities

3. These are examples of scalar quantities:
a) Energy
b) Impulse
c) Force
d) Speed
e) A and D are correct

4. These are example of vector quantities:
a) Energy
b) Impulse
c) Force
d) Speed
e) B and C are correct

5. It is the result of the addition and subtraction between vectors, that is, two or more vectors, it can be replaced by a only one vector with the same effect, called:
a) Resultant vector
b) Balancing vector
c) Scalar quantities
d) Vector quantities

6. Vectors acting in the same place are called:
a) Concurrent
b) Coplanar
c) Scalar
d) Vectors

7. Vectors acting in the same point are called:
a) Concurrent
b) Coplanar
c) Scalar
d) Vectors

8. Calculate the rectangular component on the x-axis of F1=80N and 45º

a) 26.56N
b) 36.56N
c) 46.56N
d) 56.56N

9. Calculate the rectangular component on the y-axis of F1=80N and 45º
a) 26.56N
b) 36.56N
c) 46.56N
d) 56.56N

10. Calculate the resultant force of: F_1=200N a θ_1=12° and F_2=300N, θ_2=300° (WRITE THE ENTIRE PROCEDURE)
a) F_R = 108N, θR =327.73°
b) F_R = 208N, θR =327.73°
c) F_R = 308N, θR =327.73°
d) F_R = 408N, θR =327.73°

11. Find the quantity and the direction from the resultant vector of the following vectors:
V1 = 45 N a 25º y V2 = 60N a 70º (WRITE THE ENTIRE PROCEDURE)
a) VR= 97.17N   ØR= 61. 2º
b) VR= 97.17N   ØR= 51º
c) VR= 107.17N   ØR= 61. 2º
d) VR= 97.907N   ØR= 151º
e) VR= 97.408N   ØR= 16. 2º

12. Kind of motion in which a body displaces with constant and uniform velocity.
a) Uniform rectilinear motion
b) Circular-dimensional motion
c) Uniform rectilinear motion
d) Free fall

13. Calculate the average speed of a train that runs 100km with a time of 30 min. Express the result in m/s. (WRITE THE ENTIRE PROCEDURE)
a) 55.55 m/s
b) 29 m/s
c) 27 m/s
d) 30 m/s
e) 18 m/s

14. A ship moves with a constant velocity of 14 km/hr, find the distance it makes during one day.
(WRITE THE ENTIRE PROCEDURE)
a) 400 Km.
b) 600 Km.
c) 300km
d) 336 Km.
e) 318 Km.

15. A car runs 80km per hour, in how much time does it runs 240 km? (WRITE THE ENTIRE PROCEDURE)
a) 1hr
b) 2hr
c) 3hr
d) 4hr
e) 5hr

16. An 800 kg car is accelerated from full rest to a velocity of 20 m/s in 5 seconds. How much force is needed to produce this acceleration?
(WRITE THE ENTIRE PROCEDURE)
a) 5200N
b) 4200N
c) 3200N
d) 2200N
e) 1200N

17. A 900 kg is accelerated from full rest to a velocity of 30 m/s in 6 seconds. How much force is needed to produce this acceleration?
(WRITE THE ENTIRE PROCEDURE)
a) 5200N
b) 4500N
c) 3200N
d) 2200N
e) 1200N

STAGE 2 KINEMATICS: MOTION ALONG ONE AND TWO DIMENSIONS.

SOLVE THE FOLLOWING QUESTIONS AND PROBLEMS BY CHOOSING THE CORRECT OPTION. PROCEDURES ARE NECESSARY TO WRITE IT IN EACH PROBLEM OR ELSE IT WILL NOT BE VALIDADED.

1. **Is the motion that describes a body when it moves freely under the influence of gravity?**
   a) ULM
   b) UALM
   c) Free fall
   d) Circular motion
   e) Rotational motion

2. **Kind of acceleration in a free fall motion or of upward motion of a body.**
   a) Weight.
   b) Angular acceleration.
   c) Gravitational acceleration.
   d) Centripetal acceleration.
   e) Centrifugal acceleration.

   An object falls from a building top
3. **The time in seconds it takes to reach the surface (WRITE THE COMPLETE PROCEDURE)**
   a) 3 S
   b) 5 S
   c) 4.6 S
   d) 3.8 S
   e) 4 S

4. **The speed at which it arrives at the ground (WRITE THE COMPLETE PROCEDURE)**

   a) 50 m/s
   b) 42 m/s
   c) 39.2 m/s
   d) 30 m/s
   e) 32.9

   A stone is dropped from the top of a bridge arrives at the water with a velocity of 29.4 m/s. Find the solution of the following 2 problems:

5. **The times it takes for the stone fall (WRITE THE COMPLETE PROCEDURE)**

   a) 5 s
   b) 3 s
   c) 3.4 s
   d) 2.8 s
   e) 4.1 s

5. **The height of the bridge (WRITE THE COMPLETE PROCEDURE)**
a) 45 m
b) 40 m
c) 32 m
d) 44.1 m
e) 78.4 m

A stone is thrown vertically upward with a velocity of 49 m/s, find the answer to the following 4 questions:
7.   **The velocity at the highest point that it achieves... (WRITE THE COMPLETE PROCEDURE)**
a) 9.8 m/s
b) 98 m/s
c) 20 m/s
d) 36 m/s
e) 0 m/s

8. **The time it takes to arrive the maximum height (WRITE THE COMPLETE PROCEDURE)**
a) 5 s
b) 4 s
c) 5.4 s
d) 4.65 s
e) 3.8 s

9. **The maximum height reached (WRITE THE COMPLETE PROCEDURE)**
a) 100 m
b) 78.4 m
c) 122.5 m
d) 125 m
e) 133.2m

10. **The time it takes to arrive the launch point (WRITE THE COMPLETE PROCEDURE)**
a) 8 s
b) 10.9 s
c) 10 s
d) 9.3 s
e) 7.7 s

11. **A type of motion characterized by a mobile following a curved trajectory when thrown horizontally.**
a) Horizontal shooting
b) Parabolic shot
c) Parabolic

12. **A type of motion in which a body is thrown and follows a curved trajectory when thrown at a certain angle to the horizontal.**
a) Horizontal shooting
b) Parabolic shot
c) Parabolic

13. **¿At what angle must a projectile be launched to have its maximum displacement?**
a) 40°
b) 45°
c) 90°
d) 85°

14. **¿At what angle must a projectile be launched be launched to arrive its maximum height?**
a) 40°
b) 45°
c) 90°
d) 85°

15. **At what angle must a projectile be launched to have a horizontal range of equal magnitude as if launched at 25°?**
a) 55°
b) 45°
c) 65°
d) 35°

A stone is thrown horizontally from the top of a mountain with a vertical slope equal to 122.5 m in height, with a velocity of 20 m/s. 122.5 m high, with a velocity of 20m/s. Determine the following 3 questions: A stone is thrown horizontally from the top of a mountain with a vertical slope equal to 122.5 m in height, with a velocity of 20 m/s. 122.5 m high, with a velocity of 20m/s. Determine the following 3 questions:

16. **The time it takes to reach the surface: (WRITE THE COMPLETE PROCEDURE).**
a) 10.35 s
b) 4 s
c) 3.8 s
d) 5.0 s
e) 6.4 s

17. **Horizontal Scope: (WRITE THE COMPLETE PROCEDURE)**
a) 100 m
b) 203 m
c) 70 m
d) 86 m
e) 110 m

A golfer hits a ball with a velocity of 36 m/s at an angle of 40º. Determine the following three questions:

18. **The time the ball is in the air. (WRITE THE COMPLETE PROCEDURE)**
a) 7 s
b) 6.4s
c) 2.36 s
d) 4.72 s
e) 5.2 s

19. **The maximum height it arrives (WRITE THE COMPLETE PROCEDURE).**
a) 24.6 s
b) 27.3 s
c) 35.1 s
d) 42 m
e) 31.6 m

20. **Horizontal scope. (WRITE THE COMPLETE PROCEDURE)**
a) 140 m
b) 126.9 m
c) 130.2 m
d) 135 m
e) 116.8 m

STAGE 3: KINEMATICS: CIRCULAR MOTION

SOLVE THE FOLLOWING QUESTIONS AND PROBLEMS BY CHOOSING THE CORRECT OPTION. PROCEDURES ARE NECESSARY TO WRITE IT IN EACH PROBLEM OR ELSE IT WILL NOT BE VALIDADED.

1. **A type of motion in which a body describes a circular trajectory and whose magnitude of its tangential velocity is constant.**
a) Angular velocity
b) Parabolic shot
c) Uniform accelerated circular motion
d) Uniform circular motion
e) Angular displacement

2. **It is defined as the angle in which a body rotates in a circular motion.**
a) Parabolic shot
b) Uniform circular motion
c) Angular displacement
d) Uniform accelerated circular motion
e) Angular velocity

3. **Unit of angular measure, defined as the central angle subtending an arc of length equal to the radius of a circle.**
   a) 1 Revolution
   b) Uniform circular motion
   c) Angular displacement
   d) 1 Radian
   e) Angular velocity

4. **Unit of angular measure, defined as the angular displacement in which a body rotates one complete revolution in circular motion.**
   a) 1 Revolution
   b) 2πrad
   c) 360°
   d) 1 Radian
   e) Angular velocity

5. **How many degrees does one radian equal to?**
   a) 90°
   b) 73.5º
   c) 57.3º
   d) 360º
   e) 180º

6. **How many degrees does one revolution equal to?**
   a) 360º
   b) 180º
   c) 57.3º
   d) 73.5º
   e) 90°

7. **How many radians does one revolution equal to?**
   a) 2πrad
   b) 360º
   c) 57.3º
   d) 73.5º
   e) 90°

8. **It is defined as the ratio of angular displacement to time.**
   a) Tangential velocity
   b) Angular velocity
   c) Period
   d) Frequency

9. **It is defined as the number of revolutions that a body rotates per unit of time.**
   a) Tangential velocity
   b) Angular velocity
   c) Period
   d) Frequency

10. It is defined as the time that a body late in rotates a revolution.
a) Frequency
b) Period
c) Angular velocity
d) Tangential velocity

11. Name of the acceleration of a body moving in uniform circular motion due to the continuous change of direction of its tangential velocity.
a) Centripetal force
b) Centripetal acceleration
c) Frequency
d) Radian
e) Period

12. Name of the force directed towards the center that must be applied over the body to moves with uniform circular motion.
a) Radian
b) Period
c) Centripetal force
d) Gravitational force
e) Centripetal acceleration

A 2 kg Stone tied to the end of a 0.65 m long rope rotates horizontally, with constant speed. If the Stone rotates at a rate of 96 rpm. Determine the following six questions:

13. Its frequency in rev/s. (WRITE THE ENTIRE PROCEDURE)
a) 2 rev/s
b) 1.5 rev/s
c) 3 rev/s
d) 1.4 rev/s
e) 1.6 rev/s

14. Its period. (WRITE THE ENTIRE PROCEDURE)
a) 4 s
b) 2.8 s
c) 0.625 s
d) 3 s
e) 0.69 s

15. Its angular velocity in rad/s. (WRITE THE ENTIRE PROCEDURE)
a) 10 rad/s
b) 9.42 rad/s
c) 7.3 rad/s
d) 6.5 rad/s
e) 4.6 rad/s

16. **The tangential velocity. (WRITE THE ENTIRE PROCEDURE)**
a) 4 m/s
b) 5.4 m/s
c) 7.3 m/s
d) 6.5 m/s
e) 4.6 m/s

17. **The centripetal acceleration. (WRITE THE ENTIRE PROCEDURE)**
a) 70 m/s²
b) 65 m/s²
c) 60 m/s²
d) 75 m/s²
e) 80 m/s²

18. **The centripetal force. (WRITE THE ENTIRE PROCEDURE)**
a) 140 N
b) 120 N
c) 110 N
d) 130 N
e) 110 N

STAGE 4 APLICATIONS OF NEWTON'S LAWS

SOLVE THE FOLLOWING QUESTIONS AND PROBLEMS BY WRITING A SHORT ANSWER OR SELECTING THE CORRECT OPTION IN THE MULTIPLE OPTION ONES. <u>IT IS NECESSARY TO WRITE DOWN THE PROCEDURES IN EACH PROBLEM, THE FREE BODY DIAGRAM MUST BE INCLUDED IN EACH PROBLEM OR ELSE IT WILL NOT BE VALIDADED.</u>

|	
1. The two fields of mechanics that we are analyzing in this course.	
2. Studies the body's behavior attending the cause that modifies or produce.	
3. It is any pull or tug exerted on bodies, capable of producing changes in the motion of the bodies or deforming it.	
4. The property of bodies to resist a change in their motion or state of rest.	
5. It is defined as the quantitative measure of inertia.	
6. The force of attraction exerted by the earth on bodies.	
7. It is the change in the velocity of a mobile with respect to time.	
8. It is the graphic representation, in a coordinate system, of all forces acting on an object.	
9. "Any body at rest or in uniform motion will remain at rest or in uniform rectilinear motion unless an external force is applied to it". (RESULTANT FORCE EQUALS ZERO)	
10. (RESULTANT FORCE NOT EQUALS ZERO) "The acceleration of a body is directly proportional to the applied force and inversely proportional to the mass.''	
11. "To every force of action corresponds a force of reaction of equal magnitude, but of opposite direction.''	
12. A unit of force in the international system and defined as the force applied to a mass of 1 kg that produces an acceleration of 1 m/s².	
13. Unit of force in the CGS system and is defined as the force applied to a mass of 1 g that produces an acceleration of 1 cm/s².	
14. Force exerted by the surface on a body sliding or at rest on it and acting perpendicular to the surface.	
15. A force originating in the roughness of two surfaces in contact, parallel to the surface and opposing the sliding of one body on another. A body on another.	

PROBLEMS:

1. **A horizontal force of 40 N is applied to a block and it accelerates at a rate of 14 m/s², find the weight of the block. (WRITE THE ENTIRE FBD AND PROCEDURE)**
a) 240 N
b) 30.8 N
c) 280 N
d) 30.8 kg
e) 270 N

2. **An 800 kg car starting from rest reaches a velocity of 72 km/hr at the end of 8 s, find the quantity of the force involved. (WRITE THE ENTIRE FBD AND PROCEDURE)**
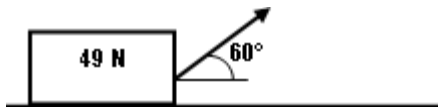a) 1600 N
b) 2000N
c) 2000 kg
d) 1600 kg
e) 1800 N

3. Over an 8 kg block it is applied two forces as shown in the figure. (WRITE THE ENTIRE FBD AND PROCEDURE)

16 N ← | 8 kg | → 24 N
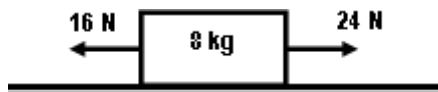
a) 1 m/s²
b) 4.5 m/s²
c) 2 m/s²
d) 2.75 m/s²
e) 2.75 m/s

4. A 49 N box is moved horizontally by the application of a force of 20 N as shown in the figure. Find the acceleration of the box. (WRITE THE ENTIRE FBD AND PROCEDURE)

49 N   60°

a) 3.1 m/s²
b) 4.5 m/s²
c) 2.9 m/s²
d) 3.8 m/s²
e) 3.6 m/s²

Find the tension in the cables supporting a 500 kg elevator, in the following 3 problems if: (WRITE THE ENTIRE FBD AND PROCEDURE)

5. Rises with an acceleration of 0.6m/s²
a) 4900 N
b) 5200 N
c) 4600 N
d) 5800 N
e) 6400 N

6. Low with an acceleration of 0.6m/s²
a) 4900 N
b) 5200 N
c) 4600 N
d) 5800 N
e) 6499 N

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7. **Rise or low with constant speed**
a) 4900 N
b) 5200 N
c) 4600 N
d) 5800 N
e) 6400 N

8. **It is defined as the ratio of the maximum static friction and the normal friction.**
a) Coefficient of kinetic friction
b) Coefficient of static friction
c) Angle of uniform sliding
d) Friction force

9. **It is defined as the ratio of kinetic friction and normal friction.**
a) Coefficient of kinetic friction
b) Coefficient of static friction
c) Angle of uniform sliding
d) Friction force

10. **Angle of inclination of an inclined plane for which a body slides downward with constant velocity.**
a) Coefficient of static friction
b) Coefficient of static friction
c) Angle of uniform sliding
d) Friction force
e) Angle of repose

11. **Angle of inclination of an inclined plane for which a body at its top at rest is about to start its motion.**
a) Coefficient of static friction
b) Coefficient of static friction
c) Angle of uniform sliding
d) Friction force
e) Angle of repose

12. **A horizontal force of 80 N is applied on a block of 50 kg, which slides horizontally with uniform velocity. Find the coefficient of kinetic friction (WRITE THE ENTIRE FBD AND PROCEDURE.)**
a) 0.2
b) 0.31
c) 0.16
d) 0.12
e) 0.23

13. **On a 20kg box a horizontal force is applied that accelerates it over a horizontal floor at a rate of 0.75 m/s², if the coefficient of kinetic friction is 0.2, find the magnitude of the applied force. (WRITE THE ENTIRE FBD AND PROCEDURE)**
a) 54.2 N
b) 39.2 N
c) 60.7 N
d) 48.6 N
e) 70 N

14. **On a 5 kg block a force of 20 N inclined 20º with respect to the horizontal is applied and it slides horizontally with constant velocity. Find the coefficient of kinetic friction (WRITE THE ENTIRE FBD AND PROCEDURE).**
a) 0.3
b) 0.21
c) 0.44
d) 0.5
e) 0.35

15. **Branch of physics and part of the dynamic that studies bodies in equilibrium.**
a) Kinematic
b) Dynamic
c) Static
d) Mechanic

16. **Name given to the forces that are in the same plane.**
a) Inertia
b) Concurrent forces
c) Coplanar forces
d) Weight
e) Force

17. **Name given to the forces that act or pass over the same point.**
a) Inertia
b) Concurrent forces
c) Coplanar forces
d) Weight
e) Force

18. It is when $F_R=0$ or zero :

a) The body is at rest
b) The body has constant velocity
c) The body is with constant acceleration
d) a and b are correct

19. It is that force that has the same quantity and direction, but opposite direction to the resultant force.

a) Concurrent forces
b) Coplanar forces
c) Friction force
d) Balancing force

20. A block weighing 8163 kg, is suspended by two wires as shown in the figure. Find the tension in the cable B. (WRITE THE ENTIRE FBD AND PROCEDURE)
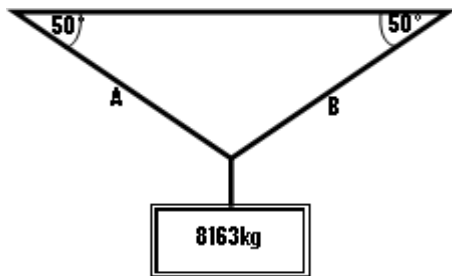
a) 52200 N
b) 60000 N
c) 25000 N
d) 100000 N
e) 48000 N