المدرسة الأهلية AHLIA SCHOOL BAHRAIN	**FINAL TERM EXAMINATION FIRST SEMESTER REVISION BOOKLET**
	Grade : 10
AY 2018 - 2019	**Subject: Physics**
	Teacher: Mr. Dan Gilbert P. Rosario

Q1.Completion. On each line, write the term from the word bank below that correctly completes each sentence.

force	weight	9.8 m/s^2	free fall	tension
velocity-time graph	Newton's third law	acceleration	net force	Newton's first law
free-fall acceleration	contact force	directly proportional	instantaneous acceleration	Newton's second law

1. _____ is the rate at which an object's velocity changes.
2. The motion of falling objects when air resistance is negligible is called _____.
3. A _____ is a graph that shows how velocity is related to time.
4. _____ is a type of acceleration of an object at an instant of time.
5. A specific type of acceleration of an object in free fall that results from the influence of Earth's gravity is _____.
6. A push or a pull is a _____.
7. _____ is a force exerted by any segment of a rope or string/yarn.
8. A type of force that acts on an object by touching it is _____.
9. The vector quantity that relates an object's mass to the gravitational force it experiences at a given location is _____.
10. _____ of motion states that "the two forces in an interaction pair act on different objects and are equal in magnitude and opposite in direction."
11. The acceleration of an object is _____ to the net force on it and inversely proportional to its mass.
12. _____ is the vector sum of two or more forces acting on an object.
13. The standard value of acceleration due to gravity, *g*, on the surface of the earth is _____.

14. _____ of motion states that “an object that is at rest will remain at rest, and an object that is moving will continue to move in a straight line with constant speed, if and only if the net force acting on the object is zero.”

15. _____ of motion states that “the acceleration of an object is directly proportional to the net force on it and inversely proportional to its mass.”

Q2: Check ‘True’ if the statement is correct and ‘False’ if the statement is incorrect.

	True	False
1. Acceleration is a change in velocity caused by an unbalanced force.		
2. Newton’s second law can be written as the equation $a = F_{net}/m$.		
3. Force and acceleration are both scalar quantities.		
4. An object’s acceleration and the net force acting on that object are proportional.		
5. When the net forces acting on an object sum to zero then the object is accelerating.		
6. Gravity is a type of contact force.		
7. Free fall is the motion of a falling object when the air resistance is negligible.		
8. If you drop a rock, its speed after 3s will be 19.6 m/s.		
9. The decision to treat free-fall acceleration as positive or negative depends on the coordinate system you use.		
10. If you toss a ball up, it reaches its maximum height when its velocity is zero.		
11. If you toss a ball up, its acceleration due to gravity, *g*, at its maximum height is zero.		
12. If a tossed ball had no velocity or acceleration, it would have no motion at all.		
13. A book lying on a table involves tension.		
14. Two teams participating in a tug-of-war involves tension.		
15. Tension is involved in parachuting.		

Q3. Multiple Choice. Encircle the letter of the correct answer.

1. When acceleration and velocity vectors are pointing in opposite directions, the object is _____.
   A. speeding up
   B. slowing down
   C. moving at constant speed
   D. not moving

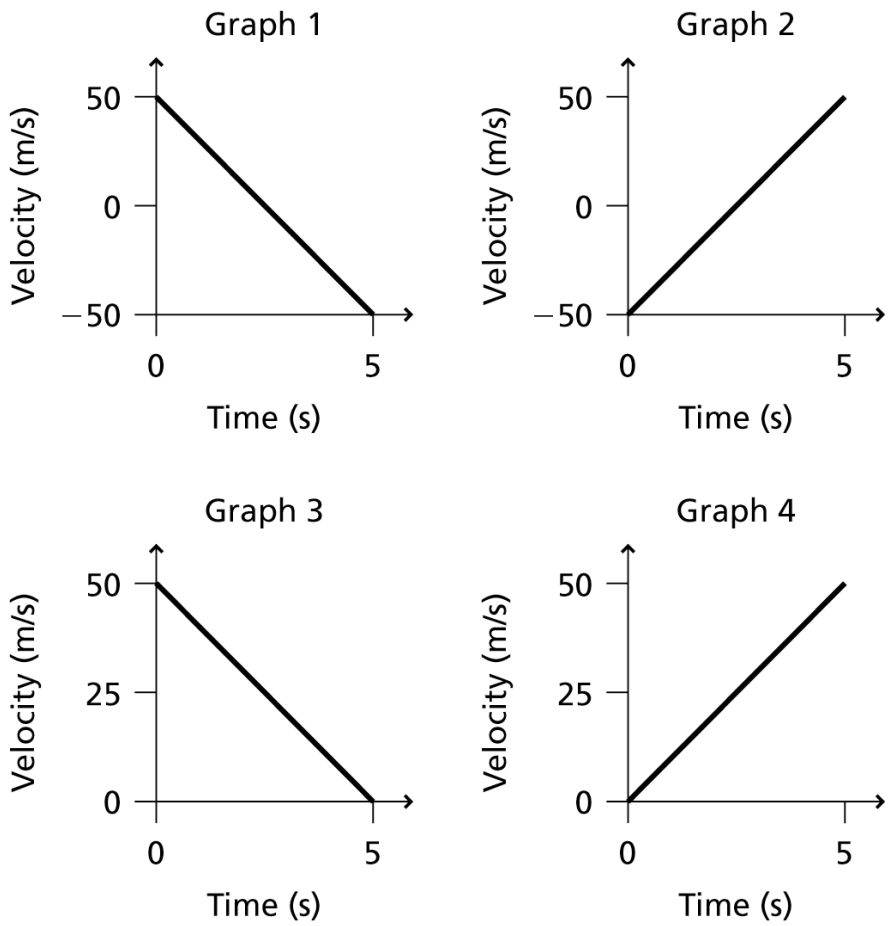
2. If a runner accelerates from 2 m/s to 3 m/s in 4 s, her average acceleration is _____.
   A. 4.0 m/s^2
   B. 2.5 m/s^2
   C. 0.40 m/s^2
   D. 0.25 m/s^2

3. If you close your eyes and feel as if you are not moving, you may be experiencing _____.
   A. non-uniform motion
   B. acceleration
   C. uniform motion
   D. circular motion

4. Which of the following results in the largest acceleration?
   A. a small change in velocity over a short time interval
   B. a large change in velocity over a short time interval
   C. a small change in velocity over a long time interval
   D. a large change in velocity over a long time interval

5. As velocity increases, an object's displacement _____.
   A. cannot be determined
   B. remains the same for each time interval
   C. decreases for each time interval
   D. increases for each time interval

Use the graphs to answer questions 6 and 7.



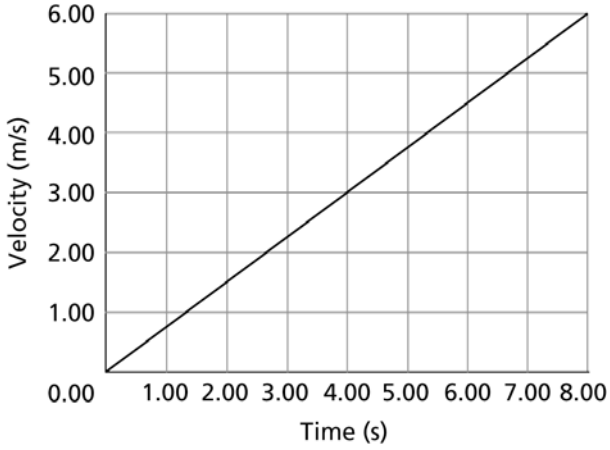
6. Which graph might represent the acceleration of a jet plane moving down a runway from a rest position?

   A. Graph 1
   B. Graph 2
   C. Graph 3
   D. Graph 4

7. Which graph might show the velocity of a ball that is thrown straight up into the air and allowed to fall freely to the ground?

   A. Graph 1
   B. Graph 2
   C. Graph 3
   D. Graph 4

8. The graph shows the velocity of a bicycle as the rider moves away from a curb.



Based on the slope of the graph, what is the average acceleration of the bicycle?

A. 6.00 m/s^2
B. 3.00 m/s^2
C. 1.33 m/s^2
D. 0.750 m/s^2

9. A car's velocity decreases from 22.0 m/s to 10.0 m/s over a period of 3.0 s. What is the car's average acceleration?

A. - 4.00 m/s^2
B. - 3.00 m/s^2
C. 3.00 m/s^2
D. 4.00 m/s^2

10. Moving faster as you pedal your bicycle harder on a level road demonstrates Newton's _____ law.

A. first
B. second
C. third
D. gravity

11. According to Newton's _____ law, an object with no net force acting on it remains at rest or in motion with a constant velocity.

A. first
B. second
C. third
D. gravity

12. If you push against a wall, the wall pushes back against you with _____ force.
    A. no
    B. less
    C. equal
    D. more

13. The force exerted by any segment of a string or rope on an adjoining segment is _____.
    A. drag force
    B. friction
    C. gravity
    D. tension

14. Two teams, the Fifes and the Drums, are playing tug-of-war. Each team has 3 members. Both teams exert a force of 2002 N on the rope. The rope is not accelerating. What is the net force on the rope?
    A. 0 N
    B. 333 N
    C. 2002 N
    D. 4004 N

15. Two people are paddling together in a canoe. Each exerts a horizontal force of 238 N toward the back of the canoe. What is the net horizontal force on the canoe?
    A. 119 N
    B. 238 N
    C. 476 N
    D. 952 N

16. Two horizontal forces, one 180.0 N and the other 200.0 N, are exerted in opposite directions on a boat on a lake. What is the magnitude of the net horizontal force on the boat?
    A. 119 N
    B. 238 N
    C. 476 N
    D. 952 N

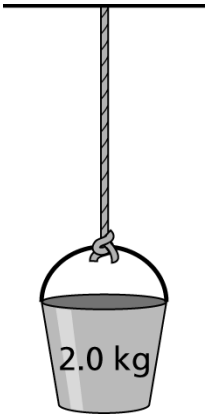
17. What is the magnitude of the force of gravity on a person who has a mass of 80.0 kg?

A. 176 N
B. 686 N
C. 784 N
D. 801 N

18. A 60.0-kg boy rides in an elevator that accelerates upward at 1.80 m/s2. What is the magnitude of the net force exerted on the boy?

A. 9.8 N
B. 108 N
C. 480 N
D. 588 N

Use the diagram to answer problems 19 and 20.



19. The figure shows a bucket hanging motionless from a rope. Assume that the rope has no mass. What is the net force on the bucket?

A. 0 N
B. 2 N
C. 9.8 N
D. 19.6 N

20. What is the tension on the rope?

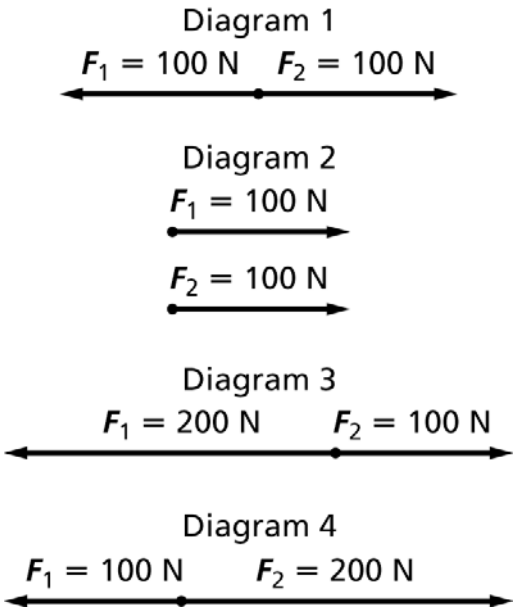
A. 0 N
B. 2 N
C. 9.8 N
D. 19.6 N

Q4. Short Answer. Respond to each question or statement on the lines provided.

1. Suppose you throw a ball straight up into the air. Describe the changes in the velocity and acceleration of the ball.

_____
_____
_____
_____
_____

2. The free-body diagrams below show four ways that two different forces could be exerted on an object.



A. Explain why diagram 1 is in state of equilibrium.

_____
_____
_____
_____
_____

B. Explain why diagrams 3 and 4 are not on the state of equilibrium.

_____
_____
_____
_____
_____

3. The tugboat has an engine that is much smaller than the massive engines of the ocean-going ship.

A. Explain how the tugboat can pull the larger mass and position it in the harbor.

_____
_____
_____
_____
_____

B. Describe the forces acting on both boats in this situation.

_____
_____
_____
_____
_____

C. Discuss what would happen if the towline suddenly came loose.

_____
_____
_____
_____
_____

4. Why should race cars in Formula One be light weight/ be built with less mass?

_____
_____
_____
_____
_____

Q5. Classification. Classify the following situations by checking:

A if its Newton's first law
B if it is Newton's second law
C if it is Newton's third law

	A	B	C
1. faster race cars are lighter in mass			
2. it is painful to slap a wall			
3. space rocket ships move up and it pushes huge amount of force towards the ground			
4. holding on a basket full of fruits for a longer period of time leaves marks on our hands			
5. paddling the boat backwards pushes the boat forward			
6. A 50-kg runner is faster than 100-kg runner			
7. asteroids constantly move in the space due to inertia			
8. when you fire a gun, it recoils			
9. seatbelts provide a safe system to passengers when car suddenly stops			
10. more horses pulling a crate will move the crate faster			

Q6: Application. Answer the following questions.
In order to receive credit for problem solving you MUST show your work with the proper magnitude and unit in the final answer. Use a calculator but you must show all of the steps in the spaces provided.

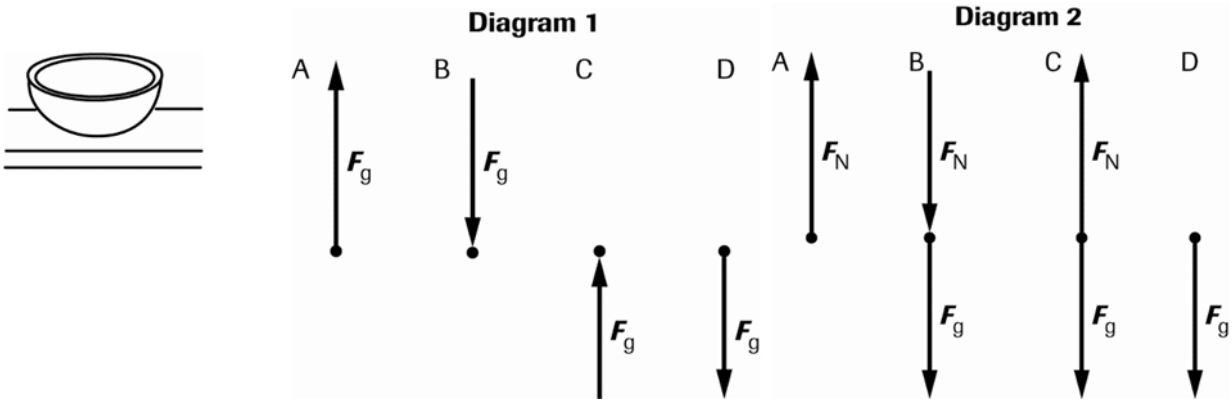
1. Solve for the weights (on earth and on the moon) of the following masses.

Mass (kg)	Acceleration due to gravity ($g= 9.8m/s^2$)	Weight= mg ($1 N= 1kg.m/s^2$)	Weight on Moon (1/6) ($1 N= 1kg.m/s^2$)
2.707 kg	$9.8m/s^2$		
1.750 kg	$9.8m/s^2$		
5.120 kg	$9.8m/s^2$		
8.888 kg	$9.8m/s^2$		
1.227 kg	$9.8m/s^2$		

2. You place a water melon on a spring scale calibrated to measure in Newtons (N). If the mass of the water melon is 4.0 kg, what is its reading? Note: Consider the acceleration due to gravity,*g.*

Given :	Unknown:
Solution:	Final Answer : (with proper unit)

Q7: Interpreting a Diagram. Refer to the diagram below. Interpret the diagram by answering the question that follows.



1. What part of Diagram 2 best represents the bowl in equilibrium?

   _____

2. What part of Diagram 1 best represents the weight force of the bowl sitting on a shelf?

   _____

3. Which part of Diagram 2 best represents the bowl if it falls off the shelf?

   _____

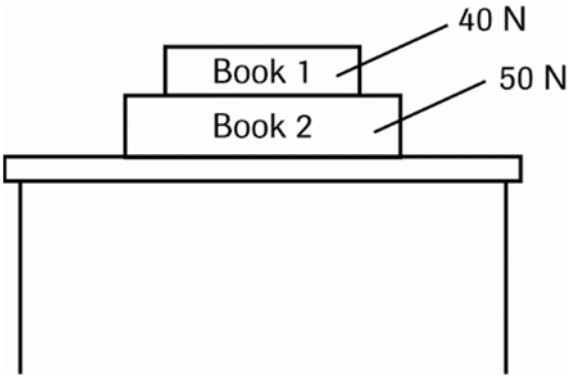
4. What does F_N represent?

   _____

5. What is the magnitude of the net force on the bowl in equilibrium?

   _____

Q8: Diagram Analysis. Refer to the diagram below to complete the table.



Force	Magnitude *(in N)*	Direction *(up or down)*
$F_{\text{book 1 on book 2}}$		
$F_{\text{book 2 on book 1}}$		
$F_{\text{book 2 on desktop}}$		
$F_{\text{desktop on book 2}}$		

Q9: Free-Body Diagram Construction. Draw a free-body diagram of each situation.

1. A space rocket immediately after vertical liftoff.

2. A chandelier on the ceiling

المدرسة الأهلية AHLIA SCHOOL BAHRAIN	**FINAL TERM EXAMINATION FIRST SEMESTER REVISION ANSWER KEY**
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Q1.

1. acceleration	6. force	11. directly proportional
2. free fall	7. tension	12. net force
3. velocity-time graph	8. contact force	13. 9.8 m/s^2
4. instantaneous acceleration	9. weight	14. Newton's first law
5. free-fall acceleration	10. Newton's third law	15. Newton's second law

Q2.

1. True	6. False	11. False
2. True	7. True	12. True
3. False	8. False	13. False
4. True	9. True	14. True
5. False	10.True	15. True

Q3.

1. B	6. D	11. A	16. D
2. D	7. A	12. C	17. C
3. C	8. D	13. D	18. B
4. B	9. A	14. A	19. A
5. D	10. B	15. C	20. D

Q4:

1. After throwing/ flight upward: velocity and acceleration increases
   Highest Point/ Maximum Height: velocity and acceleration is zero
   Flight downward: velocity and acceleration increases again

2. A. Diagram 1 is in state of equilibrium because the net force is zero.
   B. Diagram 3 and 4 is not in state of equilibrium because the net force is not zero/ 100 N.

3. A. The tugboat, inspite of its smaller machine can position the ocean-going ship because it can accelerate and increase its speed through a towline connected to the bigger ship, thus the same amount of force is pulled and pushed within the towline system.

B. In this situation, the same amount of force is pulled and pushed within the towline system in both the tugboat and the ship.

C. If the towline suddenly came loose, the tugboat will continue to move forward as the bigger ship will still continue to move in the direction of the tugboat. Eventually for a considerable amount of time the bigger ship will stop because it is no longer connected to the tugboat.

Q5:

	A	B	C
1. faster race cars are lighter in mass		✓	
2. it is painful to slap a wall			✓
3. space rocket ships move up and it pushes huge amount of force towards the ground			✓
4. holding on a basket full of fruits for a longer period of time leaves marks on our hands			✓
5. paddling the boat backwards pushes the boat forward			✓
6. A 50-kg runner is faster than 100-kg runner		✓	
7. asteroids constantly move in the space due to inertia	✓		
8. when you fire a gun, it recoils			✓
9. seatbelts provide a safe system to passengers when car suddenly stops	✓		
10. more horses pulling a crate will move the crate faster		✓	

Q6:

1.

Mass (kg)	Acceleration due to gravity (g= 9.8m/s^2)	Weight= mg (1 N= 1kg.m/s^2)	Weight on Moon (1/6) (1 N= 1kg.m/s^2)
2.707 kg	9.8m/s^2	26.5286 N	4.421433333 N
1.750 kg	9.8m/s^2	17.15 N	2.858333333 N
5.120 kg	9.8m/s^2	50.176 N	8.362666667 N
8.888 kg	9.8m/s^2	87.1024 N	14.51706667 N
1.227 kg	9.8m/s^2	12.0246 N	2.0041 N

2.

Given : m= 4.0 kg g= 9.8 m/s^2	Unknown: weight of water melon/W
Solution: W = mg = (4.0 kg) (9.8 m/s^2) = 39.20 kg. m/s^2 or N	Final Answer : (with proper unit) 39. 20 N

Q7:

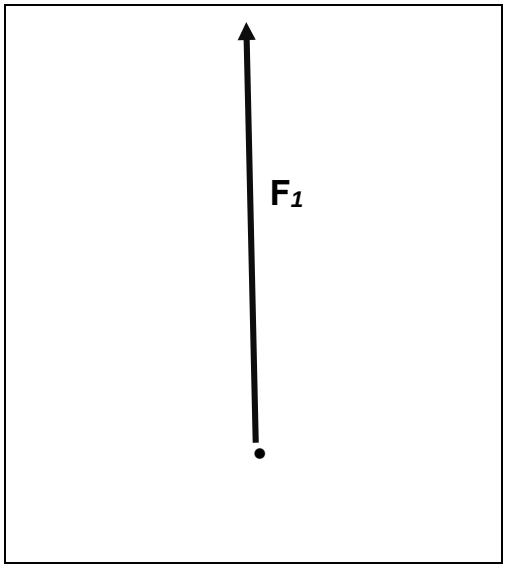
1. C
2. B
3. D
4. normal force
5. zero

Q8:

Force	Magnitude	Direction
$F_{\text{book 1 on book 2}}$	40 N	down
$F_{\text{book 2 on book 1}}$	40 N	up
$F_{\text{book 2 on desktop}}$	90 N	down
$F_{\text{desktop on book 2}}$	90 N	up

Q9:

1. A space rocket immediately after vertical liftoff.



2. A chandelier on the ceiling