Prince Sultan University

Deanship of Educational Services

Department of Mathematics
and General Sciences

COURSE DETAILS:

Introduction to Physical Science	**SCI101**	**MAJOR EXAM II**
Semester:	Spring Semester -- Term 172	
Date:	Thursday April 19, 2018	
Time Allowed:	60 minutes	

STUDENT DETAILS:

Student Name:	
Student ID Number:	
Section:	Circle your section number: 173 174 175 176
Instructor's Name:	Circle instructor's name: Dr. Hazem Abu-Farsakh Dr. Muaffaq Nofal

INSTRUCTIONS:

- You may use a scientific calculator that does not have programming or graphing capabilities. NO borrowing calculators.
- NO talking or looking around during the examination.
- NO mobile phones. If your mobile is seen or heard, your exam will be taken immediately.
- Show all your work when required and be organized.
- You may use the back of the pages for extra space, but be sure to indicate that on the page with the problem.

GRADING:

	Page 1	**Page 2**	**Page 3**			**Total**
Mark						
Full Mark	**12**	**4**	**4**			**20**

Part 1 (12 marks): Indicate the answer choice that best completes the statement or answers the question
(Assume g = 10 m/s^2)

Q1. The engine of a 1800 kg sports car can increase its speed from 0 to 27 m/s in 2.5 seconds. How much power is required for that?
a) 262.44 kW b) 24.3 kW c) 121.5 kW d) 656.1 kW

Q2. How much work is done by you when you carry a 20 kg box for a horizontal distance of 5 m at constant velocity?
a) 100 J b) 1000 J c) 500 J d) zero

Q3. The gravitational attractive force between two objects is 200 N. How much will the force become if the distance between their centers is doubled?
a) 400 N b) 800 N c) 100 N d) 50 N

Q4. A floating object always displaces its own
a) weight of liquid b) volume of liquid c) density of liquid d) none of these

Q5. On a windy day waves in a lake or ocean are higher than their average height. This is best explained by:
a) Archimedes principle b) Pascal's principle c) Bernoulli's principle d) None of these

Q6. A hydraulic device has two pistons, one with a small cross-section area and another piston with a larger cross-section area. If a given force is applied to the small piston, the output force on the larger-area piston will be
a) less b) greater c) the same d) none of the above

Q7. Liquid pressure at the bottom of a lake depends on
a) the weight of water in the lake
b) the surface area of the lake
c) the depth of the lake
d) all of the above

Q8. The specific heat capacity of aluminum is higher than that of copper. If equal quantities of heat are given to equal masses of aluminum and copper initially at the same temperature, then
a) the final temperature of aluminum will be higher
b) the final temperature of copper will be higher
c) they will have the same final temperatures
d) none of the above

Q9. The atmospheric pressure at the summit of Mount Everest is about 34 kPa. What will be the height of mercury in a barometer at that location? (given the density of mercury = 13.6 g/cm^3)
a) 25 cm b) 35 cm c) 40 cm d) 45 cm

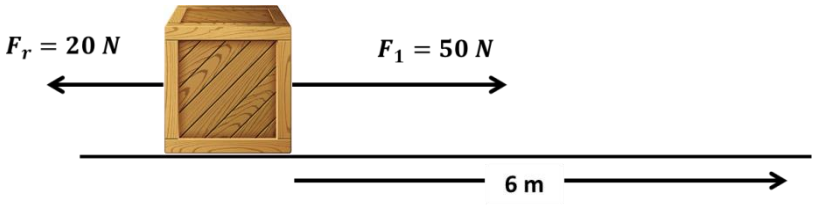
Q10. An object of volume 0.02 m^3 and density 1.5 g/cm^3 is immersed in oil of density 0.9 g/cm^3. How much buoyant force acts on the object?
a) 300 N b) 120 N c) 180 N d) 430 N

Q11. The freezing point of water is equal to
a) 0 K b) −32 °F c) 32 °F d) −273 K

Q12. Given the specific heat capacity of gold is 129 J/kg.°C, how much thermal energy is required to increase the temperature of 50 g of gold from 25 °C to 30 °C?
a) 32.25 J b) 193.5 J c) 1290 d) 64.5 J

Part 2 (8 marks): Solve the following three questions in the provided space and show your solution.

Q1. (4 marks) In the figure, an 8 kg box is pushed from rest on a horizontal surface for a distance of 6 m to the right with a horizontal force $F_1 = 50\ N$. The force of friction on the box is $F_r = 20\ N$. Calculate



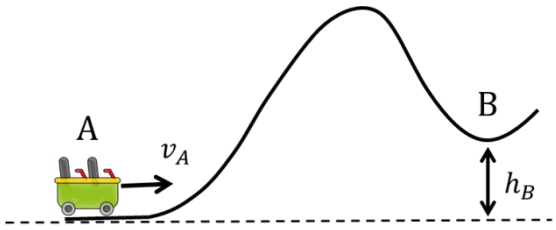
a) The work done by the force F_1

b) The work done by the friction force F_r

c) The total work done on the box

d) Use the work-energy theorem to determine its final speed after 6 m

Q2. (2 marks) If the speed of the 300 kg roller coaster cart at point A is $v_A = 20$ m/s and its speed at point B is $v_B = 10$ m/s, determine the height of the cart at point B, shown as h_B in the figure.



Q3. (2 marks) A 2 kg amount of water at 20 °C is mixed with a 1 kg amount of water at 5 °C. Determine the final temperature of the mixture, given the specific heat capacity of water is 4180 J/kg.°C

Scratch Paper
Do not remove