



GRADE 10 SCIENCE (20F)

Practice Final Examination

GRADE 10 SCIENCE

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Name: _____

Student Number: _____

Attending Non-Attending

Phone Number: _____

Address: _____

For Marker's Use Only

Date: _____

Final Mark _____ /100 = _____ %

Comments:

Instructions

- You have a maximum of 2.5 hours to write this exam.
- Supplies required: pencil or pen, eraser, paper, ruler—you are permitted to bring a calculator, but it is not required
- This exam covers course material from Modules 3 and 4.
- This exam is worth 20 percent of your final mark.

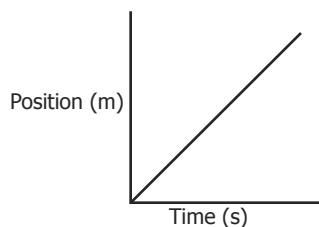
Part A: In Motion

Section 1: Multiple Choice

Choose the best answer. Each question is worth one mark. This section of the final exam is worth 25 marks.

1. Jackson travels 2 km north, then 3 km east, and finally 2 km south. Which statement is true?
 - a. Jackson's displacement is 2 km west from his origin.
 - b. Jackson is now 3 km east from where he started.
 - c. Jackson's displacement is 7 km.
 - d. None of the above.

2. Velocity is a measure of
- change in position during a change in time
 - the slope of a position-time graph
 - displacement during an interval of time
 - all of the above
3. Which of the following is a vector quantity?
- time
 - velocity
 - speed
 - distance
4. A car accelerates from 0 m/s to 25 m/s in 5 seconds. What is the average acceleration of the car?
- 30 m/s^2
 - 50 m/s^2
 - 125 m/s^2
 - 5 m/s^2
5. Which scenario represents an instant of time?
- A long-distance runner crosses the finish line at 1 hour, 37 minutes.
 - A businesswoman takes a two-hour flight from Winnipeg to Montreal.
 - An ambulance drives for two minutes to arrive at the scene of an accident.
 - A student leaves home at 8:15 and gets to school at 8:30.
6. What does the following position-time graph tell us about the motion of the object?



- The object is accelerating in the positive direction.
- The object is moving in the positive direction at a constant velocity.
- The object is in uniform motion and headed in the negative direction.
- The object is not moving.

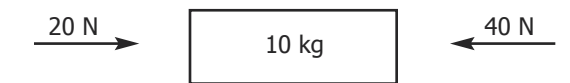
Name: _____

7. An object has an initial velocity that is negative. If the acceleration of the object is positive, how will velocity be affected?
 - a. Velocity will decrease.
 - b. Velocity will increase.
 - c. Velocity will be constant.
 - d. Velocity will either increase or decrease.

8. Galileo proposed a thought experiment where a sphere would be rolled down a U-shaped incline. In an "ideal scenario," the sphere would move along the incline until it returned to its original height. Why will this not occur in real life?
 - a. The force of gravity prevents the sphere from moving upward.
 - b. The friction between the sphere and the incline reduces the sphere's energy.
 - c. The momentum of the sphere increases as it moves, causing it to rise above its original height.
 - d. The sphere experiences a second collision with the incline, reducing its velocity.

9. Newton's third law of motion states the following:
 - a. An object at rest will remain at rest unless acted on by an unbalanced force.
 - b. For every action there is an equal and opposite reaction.
 - c. Moving objects will remain in motion until acted on by an unbalanced force.
 - d. The greater an object's mass, the greater the force needed to accelerate the object.

Use the following diagram to answer questions 10, 11, and 12.



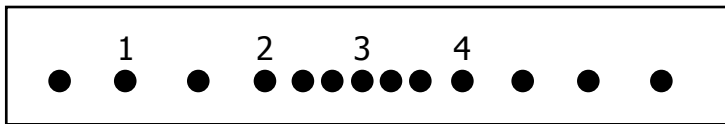
10. What is the net force acting on the object?
 - a. +20 N
 - b. +40 N
 - c. -20 N
 - d. -60 N

11. How quickly is the object accelerating?
- a. -2 m/s^2
 - b. $+4 \text{ m/s}^2$
 - c. -4 m/s^2
 - d. $+2 \text{ m/s}^2$
12. If the object starts from rest, what velocity will it reach after 5 seconds?
- a. $+20 \text{ m/s}$
 - b. $+10 \text{ m/s}$
 - c. -10 m/s
 - d. -20 m/s
13. Which of the following objects has the greatest momentum?
- a. a statue bolted to the ground
 - b. a teenager walking on the sidewalk
 - c. a bicycle moving at 10 m/s
 - d. a car driving at 5 km/h
14. Impulse is the product of
- a. mass and velocity
 - b. force and time
 - c. acceleration and energy
 - d. displacement and speed
15. Which driving surface would provide the greatest friction?
- a. ice
 - b. wet concrete
 - c. dry pavement
 - d. steel
16. Which of the following is *not* an example of energy conversion in a car crash?
- a. leaking engine fluid
 - b. crumpled bumpers
 - c. skid marks on the road
 - d. loud noises

Name: _____

17. A rolling bowling ball has a momentum of 500 kg-m/s. What impulse will it apply to the bowling pin it strikes?
- 250 N-s
 - 500 N-s
 - 1000 N-s
 - 100 N-s
18. A second collision occurs
- when passengers in a collision collide with their own vehicle
 - when two cars collide with each other
 - when two objects scrape against each other, reducing velocity
 - when a moving vehicle collides with a stationary object
19. A crane lifts a set of steel girders to the upper floor of a construction site. What type of energy do the girders contain when they stop at the upper floor?
- kinetic energy
 - thermal energy
 - potential energy
 - spring energy
20. The crane in question 19 breaks and the girders fall to the earth. What type of energy do the girders contain just before they hit the ground?
- kinetic energy
 - thermal energy
 - potential energy
 - charge energy

On the following tickertape, each dot represents the distance an object travelled after 1 second. Use the diagram to answer questions 21 and 22.



21. Describe the motion of the object.
 - a. The object is speeding up, and then slowing down.
 - b. The object is slowing down, and then speeding up.
 - c. The object's motion is uniform.
 - d. None of the above.
22. At what point does the object have the greatest momentum?
 - a. Point 1
 - b. Point 2
 - c. Point 3
 - d. Point 4
23. Finding the slope on a velocity-time graph would allow you to determine
 - a. velocity
 - b. speed
 - c. acceleration
 - d. displacement
24. What is the relationship between reaction time and braking distance?
 - a. When reaction time increases, braking distance decreases.
 - b. When reaction time increases, braking distance increases.
 - c. When reaction time decreases, braking distance increases.
 - d. Reaction time does not affect braking distance.
25. In an accident, the distance a passenger is thrown from a moving car is related to
 - a. the mass of the car
 - b. the car's acceleration before the collision
 - c. the size of the object that the car collides with
 - d. the speed of the car before it collided with another object

Name: _____

Section 2: Explain

For this section, please explain your answers in detail and in complete sentences. For example, if the response is worth three marks, your answer should include at least three (3) important points that relate to the question. Where mathematical calculations are necessary, include all calculation steps in your answer(s). This will assist the tutor/marker in evaluating your complete solution. The mark allocations are provided for each question. This section of the final exam is worth 30 marks.

1. You are driving on dry pavement at 60 km/h. You are 85 metres from the next intersection when its traffic lights turn yellow.
 - a. Are you able to stop your car before reaching the intersection? Assume your reaction time is 3 seconds and the frictional constant of dry pavement is 0.06. Show all calculations. (6 marks)

b. How would your braking distance be affected if you had travelled twice as fast?
(3 marks)

c. How could you improve your reaction time while driving? Give two examples.
(2 marks)

2. A bicycle and a car both drive over some broken glass and get flat tires. Luckily, both are only 50 m from a repair shop.

a. Which vehicle – the car or the bicycle – will be easier to push into the shop? Use Newton’s laws of motion to explain why. (2 marks)

b. The driver pushes and forces his car to move. It accelerates at a rate of 3 m/s^2 . If the car has a mass of 600 kg, how much force is he applying to his vehicle? Show all calculations. (2 marks)

3. Define impulse. Use impulse to explain how the air bags in a car reduce injuries in a vehicle collision. (3 marks)

Name: _____

4. Use the concept of inertia to explain why it is important to wear a seat belt when in a moving vehicle. (5 marks)

5. Elaine is watching the Canada Day fireworks display at The Forks. What are four different types of energy involved in a fireworks rocket? (4 marks)

6. Calculate the total braking distance for a car travelling at 60 km/h on a rain-soaked road (where $k = 0.10$). (3 marks)

Part B: Weather Dynamics

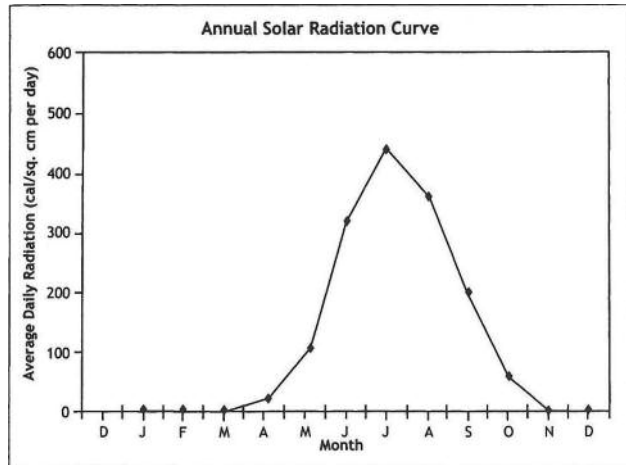
Section 1: Multiple Choice

Choose the best answer. Each question is worth one mark. This section of the final exam is worth 25 marks.

1. The gas that is most abundant in Earth's atmosphere is
 - a. hydrogen
 - b. carbon dioxide
 - c. nitrogen
 - d. oxygen
2. How does life on Earth benefit from the ozone layer?
 - a. The ozone layer prevents atmospheric gases from escaping into space.
 - b. The ozone layer warms the lower levels of the atmosphere.
 - c. The ozone layer absorbs harmful ultraviolet radiation from the Sun.
 - d. The ozone layer breaks down greenhouse gases in the troposphere.
3. As you increase altitude in Earth's atmosphere
 - a. air pressure increases and density decreases
 - b. air pressure decreases and density increases
 - c. air pressure and density increase
 - d. air pressure and density decrease
4. What change would occur if Earth's albedo increased?
 - a. Global temperatures would increase.
 - b. Global temperatures would decrease.
 - c. Global temperatures would fluctuate more rapidly.
 - d. There would be no change to global temperatures.
5. The Coriolis effect causes
 - a. low-pressure systems to rotate counter-clockwise over Australia
 - b. low-pressure systems to rotate clockwise over Manitoba
 - c. low-pressure systems to rotate clockwise over South Africa
 - d. air masses to be deflected to the left in the Northern Hemisphere as they move toward the North Pole

Name: _____

6. Humidity refers to
 - a. the amount of water vapour in the air
 - b. the local temperature at sea level
 - c. the intensity of the radiation from the Sun
 - d. the temperature at which water vapour in the air condenses
7. Which of the following chemicals is a greenhouse gas?
 - a. H_2O – water vapour
 - b. CO_2 – carbon dioxide
 - c. CH_4 – methane
 - d. all of the above
8. Which of these is *not* a way that scientists use the information they get from ice core samples?
 - a. Fossilized air bubbles help scientists figure out what gases were present in the atmosphere.
 - b. Each snow layer can give information about the day-to-day weather in that year.
 - c. Scientists can figure out how much volcanic activity occurred from the amount of dust in each layer.
 - d. Each layer provides information about how much snow fell that year.
9. The layer of the atmosphere closest to the surface of Earth is the
 - a. troposphere
 - b. mesosphere
 - c. stratosphere
 - d. thermosphere
10. Meteorologists use satellite images to study
 - a. cloud shapes and heights
 - b. cloud movement
 - c. beginnings of hurricanes
 - d. all of the above



11. The graph above indicates the amount of solar radiation that a certain location on Earth received over the course of a year. This data was most likely recorded at
 - a. Whitehorse, Yukon
 - b. Paris, France
 - c. Honolulu, Hawaii
 - d. Sydney, Australia

12. How does El Niño affect Manitoba winters?
 - a. El Niño produces severely cold winters with high precipitation.
 - b. El Niño produces mild winters with high precipitation.
 - c. El Niño produces severely cold winters with little precipitation.
 - d. El Niño produces mild winters with little precipitation.

13. Manitoba enters the winter season
 - a. when Earth is furthest from the Sun during its revolution
 - b. when the Northern Hemisphere is tilted away from the Sun
 - c. at the same time that Europe enters the summer season
 - d. because of an acceleration in Earth's rotation

14. On a weather map, isobars are lines that connect areas of
 - a. equal air pressure
 - b. equal elevation
 - c. equal temperature
 - d. equal precipitation

Name: _____

15. A winter blizzard in Manitoba is most likely to occur as a consequence of the formation of a
 - a. cold front
 - b. tropical depression
 - c. Colorado low
 - d. occluded front

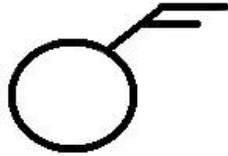
16. The temperature at which water vapour in the air condenses is called
 - a. the precipitation effect
 - b. the humidity
 - c. the water cycle
 - d. the dew point

17. One change we might expect due to climate change is
 - a. cooler temperatures causing the Boreal Forest to shrink
 - b. warmer lake temperatures increasing the oxygen content of the water
 - c. increased flood-absorbing capacities of wetlands
 - d. loss of native plants and animal species

18. The jet stream is defined as
 - a. high-speed winds in the upper atmosphere
 - b. ocean currents found deep below the surface
 - c. a narrow band of heavy snow that blows in off the Great Lakes
 - d. the prevailing winds located exclusively in the Arctic

19. The Doppler effect is used when
 - a. measuring the speed of a baseball as it leaves the pitcher's hand
 - b. using Environment Canada's Doppler radar
 - c. the police use radar guns to catch speeding vehicles
 - d. all of the above

20. A rotating storm system that forms over warm, tropical waters is referred to as a
- thunderstorm
 - tornado
 - hurricane
 - tsunami



21. For the partial weather glyph shown above, which statement is correct?
- The wind is coming from the southwest at 15 knots.
 - The wind is coming from the northeast at 15 knots.
 - The wind is blowing toward the northeast at 30 knots.
 - The wind is blowing to the southeast at 30 knots.



22. If the above symbol was placed overtop a map of Brandon, Manitoba, what could you infer about the local weather?
- A cold front is overtop the city.
 - A high-pressure system is above the city.
 - A warm front is overtop the city.
 - A low-pressure system is above the city.
23. A winter storm is caused by
- an accumulation of cold, moist air
 - a pressure drop in the mesosphere
 - instabilities in the Coriolis effect
 - the interaction between warm, humid air and cold, dry air
24. Climate change scientists *cannot* find this evidence in sediments:
- the species of animals that lived in the area
 - the species of plants that lived in the area
 - the temperature of the area in the past
 - what gases were in the atmosphere in the past

Name: _____

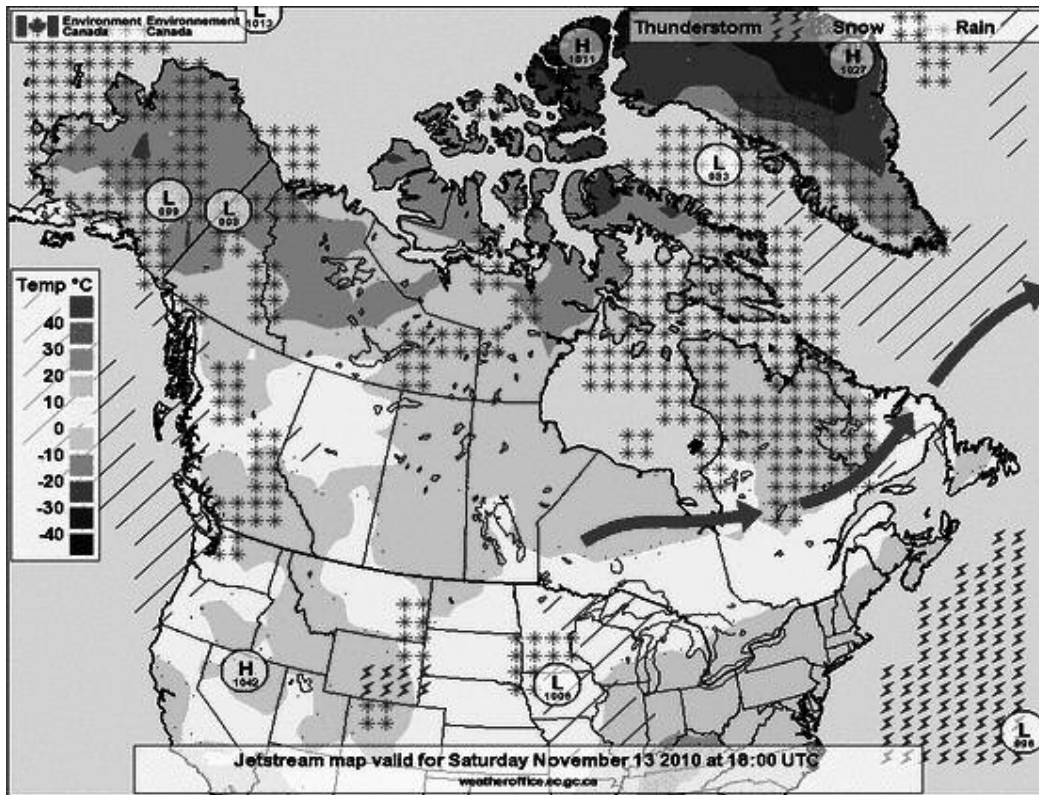
25. Current trends in climate change may result in
- a. changes to the health and well-being of polar bears
 - b. more land becoming boreal forest
 - c. a decrease in smog levels
 - d. all of the above

Section 2: Explain

For this section, please explain your answers in detail. For example, if the response is worth three points, your answer should include at least three (3) important points that relate to the question. Where mathematical calculations are necessary, include all calculation steps in your answer(s). This will assist the tutor/marker in evaluating your complete solution. The mark allocations are provided for each question. This section of the final exam is worth 20 marks.

1. Describe how a thunderstorm is formed and how lightning results. (6 marks)

2. The following graphic was taken from the Environment Canada daily forecast website for November 13, 2010. (4 marks)



Graphics courtesy of Environment Canada. All rights reserved.

a. Use the graphic to identify the expected temperature range for the following areas:

i. southern Quebec (1 mark)

ii. northern Manitoba (1 mark)

b. Identify two provinces forecasted to receive snow. (2 marks)

Name: _____

3. How is weather in the Prairie provinces predicted to change under a global warming scenario? Give three examples. (3 marks)

4. What evidence exists to suggest that Earth experiences natural cycles of warming and cooling? (3 marks)

5. How does radar work, and how can it be used to analyze weather patterns? (4 marks)
