2014 – 2015

Quarterly Science Benchmark Assessment (QSBA)

Physical Science

Second Quarter

Miami-Dade County Public Schools

Office of Academics and Transformation

Department of Mathematics and Science

INTRODUCTION

The Physical Science Quarterly Science Benchmark Assessments (QSBA) were created with the objective of assessing student performance in order to improve the quality of student learning and enhance instructional practices by using data to make curricular decisions.

The Physical Science QSBAs are designed to be administered at the start of the school year, after each nine-week period (quarter) of instruction, and at the end of the school year, focusing its questions on the scientific content delineated by the Florida Department of Education (FLDOE) Next Generation Sunshine State Standards (NGSSS) and the specific benchmarks outlined by the Physical Science course description.

The Division of Mathematics, Science, and Advanced Academic Programs highly recommends the administration of the QSBAs to be concurrent with the administration of Baseline Assessments, Fall Interim Assessments, and Winter Interim Assessments.

The Pre-Test Assessment encompasses all the main concepts and ideas of the Physical Science course, while each Quarterly Assessment addresses the main benchmarks of each quarter specific to the Topics found in the Physical Science District Pacing Guide.

The NGSSS benchmarks pertinent to each course description have been grouped according to content and placement within the District Pacing Guides in order to facilitate the analysis of each assessment.

Teachers are encouraged to debrief the results of each of the QSBAs with students and use individual test results to focus on the benchmark(s) on which a student needs further instruction. This review will assist teachers in targeting their instruction.

Teachers must use the Thinkgate Technology Platform (http://www.thinkgate.net/FLMiamiDadeSplash/TGLogin.aspx) to print answer sheets, scan, score, and produce reports. This process will enable teachers to obtain student data in order to identify strengths and weaknesses and allow teachers to target instruction and monitor progress.

Additional information regarding the use of Thinkgate can be found in the Interim Assessment section of the department of Assessment, Research, and Data Analysis (http://oada.dadeschools.net/IAP/IAP.asp)

This document was created by the Department of Mathematics and Science from District-developed questions and may include questions adapted from previously released tests with permission from the Massachusetts Department of Elementary and Secondary Education and the Pennsylvania Department of Education

Physical Science Reference Sheet

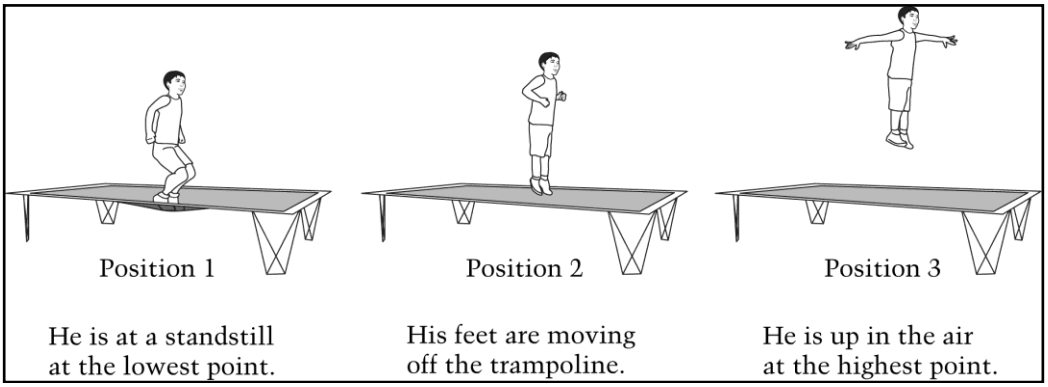
Average speed v	$= \frac{\text{distance}}{\text{time}}$	$v = \frac{d}{t}$
Acceleration a	$= \frac{\text{change in velocity } (\frac{m}{s})}{\text{time taken for this change (s)}}$	$a = \frac{V_f - V_i}{t_f - t_i}$
Density D	$= \frac{\text{mass (g)}}{\text{Volume } (cm^3)}$	$D = \frac{m}{V}$
Percent Efficiency e	$= \frac{\text{Work out (J)}}{\text{Work in (J)}}$	$\% e = \frac{W_{out}}{W_{in}} \times 100$
Force F	$= \text{mass kg} \times \text{acceleration } (\frac{m}{s^2})$	$F = ma$
Frequency (f)	$= \frac{\text{number of events (waves)}}{\text{time (s)}}$	$f = \frac{\text{n of events}}{t}$
Momentum p	$= \text{mass kg} \times \text{velocity } \frac{m}{s}$	$p = mv$
Pressure P	$= \frac{\text{Force (N)}}{\text{Area } (m^2)}$	$P = \frac{F}{A}$
Wavelength λ	$= \frac{\text{velocity } (\frac{m}{s})}{\text{frequency (Hz)}}$	$\lambda = \frac{v}{f}$
Work W	$= \text{Force N} \times \text{distance m}$	$W = Fd$
Potential Energy PE	$= \text{mass kg} \times \text{gravity } \frac{m}{s^2} \times \text{height m}$	$PE = mgh$
Kinetic Energy KE	$= \frac{1}{2} \text{ mass kg} \times \text{velocity}^2 (\frac{m^2}{s^2})$	$KE = \frac{1}{2} mv^2$

Physical Science Test Q2

1. Household appliances convert electricity into one or more different forms of energy. An electric fan can best be described as converting electricity into:

   A. heat energy only
   B. heat energy and sound energy only
   C. heat energy, sound energy, and mechanical energy only
   D. heat energy, sound energy, mechanical energy, and chemical energy

2. Which statement best explains the energy transfer as the boy moves from Position 1 to Position 2?

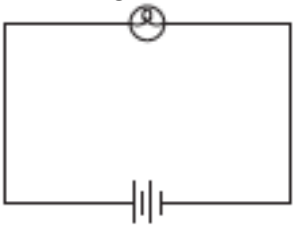


   A. The boy's kinetic energy is transferred to the elastic potential energy of the trampoline.
   B. The boy's gravitational potential energy is transferred to the elastic potential energy of the trampoline.
   C. The gravitational potential energy of the trampoline is transferred to the boy's kinetic energy.
   D. The elastic potential energy of the trampoline is transferred to the boy's kinetic energy.

3. Which statement best explains the energy transfer as the boy moves from Position 2 to Position 3?
   A. The boy's kinetic energy is transferred to the boy's gravitational potential energy.
   B. The boy's gravitational potential energy is transferred to the boy's kinetic energy.
   C. The boy's gravitational potential energy is transferred to the kinetic energy of the air molecules around him.
   D. The kinetic energy of the air molecules around the boy is transferred to the boy's kinetic energy.

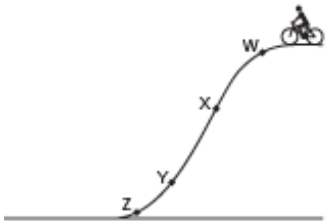
4. A cart at the top of a hill is released and rolls down the hill. Which of the following describes the energy of the cart just as it reaches the bottom of the hill?
   A. The cart has no energy.
   B. The cart has maximum kinetic energy.
   C. The cart has maximum gravitational potential energy.
   D. The cart has equal gravitational potential and kinetic energy.

5. The diagram below shows an electrical circuit.



Which of the following best explains why energy stored in the battery power source diminishes over time when this circuit is complete?
   A. Energy is destroyed when the light bulb operates.
   B. The light bulb transforms energy into light and heat.
   C. The light bulb converts the negative charge of electrons into light and heat.
   D. The power source generates energy more slowly than the light bulb consumes it.

6. The diagram below represents a bicyclist at the top of a hill, with four points labeled W, X, Y, and Z.



   Assume that the bicyclist does not apply the brakes as he rides down the hill. At which point will the bicyclist's kinetic energy be closest to zero?
   A. point W
   B. point X
   C. point Y
   D. point Z

7. A 9 kg model airplane flies horizontally at a constant speed. If the plane suddenly dives from its altitude of 50 m and levels off at 20 m, how much potential energy does it lose in the dive?
   A. 450 J
   B. 1800 J
   C. 2700 J
   D. 9000 J

8. A ball is thrown straight upward. The ball's initial speed is 30 m/s and its mass is 0.05 kg, resulting in an initial kinetic energy of 22.5 J. If the initial potential energy of the ball is 10 J and there is no frictional force, what would be the ball's total energy while it is moving?
   A. 0.0 J
   B. 10.0 J
   C. 22.5 J
   D. 32.5 J

9. A person is using a force of 200 N to push a box. How much power does the person need to push the box a distance of 4 m in 10 s?
   A. 40 W
   B. 80 W
   C. 200 W
   D. 500 W

10. In a competition, weightlifter 1 lifts a 100 kg weight from the floor. Weightlifter 2 also lifts a 100 kg weight to the same height above the floor, but takes a longer time to do so. Which of the following statements describes the work done and the power used by the weightlifters?

    A. Weightlifter 2 does the same work and uses less power compared with weightlifter 1.
    B. Weightlifter 2 does less work and uses the same power compared with weightlifter 1.
    C. Weightlifter 2 does the same work and uses more power compared with weightlifter 1.
    D. Weightlifter 2 does more work and uses the same power compared with weightlifter 1.

11. The motor of one car is more powerful than the motor of another car. Which of the following must be true of the more powerful motor?

    A. It can do work more quickly.
    B. It can operate for a longer time.
    C. It can burn fuel more efficiently.
    D. It can store more potential energy.

12. Which of the following options can be used to generate electricity?
    A. Move the circuit loop into and out of a magnetic field.
    B. Change the magnetic field strength around the circuit loop.
    C. Change the orientation of the circuit loop with respect to the magnetic field.
    D. all of the above

13. A generator with a single loop produces the greatest magnetic force on the charges and the greatest induced emf when
    A. the plane of the loop is parallel to the magnetic field.
    B. half of the loop segments are moving perpendicular to the magnetic field.
    C. the plane of the loop is perpendicular to the magnetic field.
    D. none of the above

14. Consider the following situations:
    Situation 1: A person touches a cold piece of metal.
    Situation 2: A lamp shines light on a table.

    Is energy being transferred in either of these situations?
    A. Energy is transferred in both situations.
    B. Energy is NOT transferred in either situation.
    C. Energy is transferred when a person touches a cold piece of metal, but energy is NOT transferred when a lamp shines light on a table.
    D. Energy is transferred when a lamp shines light on a table, but energy is NOT transferred when a person touches a cold piece of metal

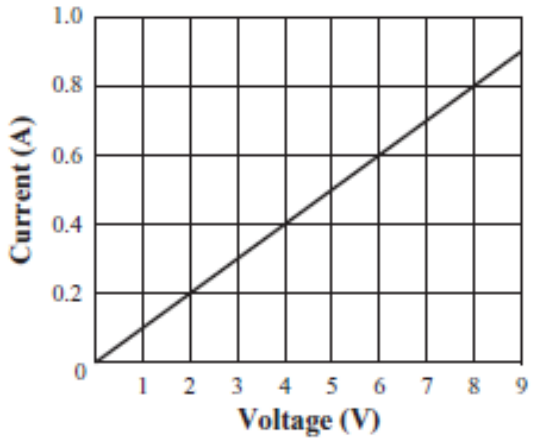
15. Which of the following observations is a result of the Doppler effect?

    A. Noise from across a lake is louder at night than during the day.
    B. A person walking notices that the pitch of a car's engine decreases as the car passes by.
    C. Beats are produced when two tuning forks with different frequencies are heard together.
    D. A person hears the sound from a radio more clearly in certain areas of a room than in others.

16. Which of the following is an example of an electromagnetic wave?
    A. a radio wave
    B. a water wave
    C. the oscillation of a spring
    D. the vibration of a violin string

17. A copper sphere, a glass sphere, a plastic sphere, and a rubber sphere are placed on individual insulating stands. A student touches each sphere with an electrically charged object.
    The sphere made of which material will distribute the electric charge fastest over its entire surface area?
    A. glass
    B. plastic
    C. copper
    D. rubber

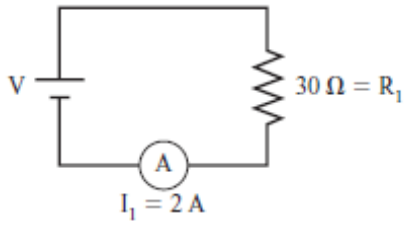
18. The graph below relates the current to voltage data for a resistor.

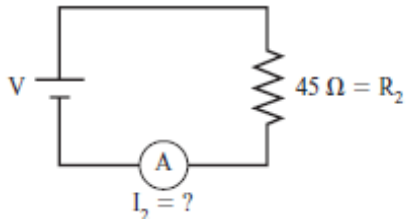


Which of the following is the value of the resistor?

A. 0.2 Ω
B. 2 Ω
C. 4 Ω
D. 10 Ω

19. The two resistors shown below are connected to identical power sources. Resistor 1 has a resistance of 30 Ω, and resistor 2 has a resistance of 45 Ω. The current in resistor 1 is 2 A.





What is the current in resistor 2?

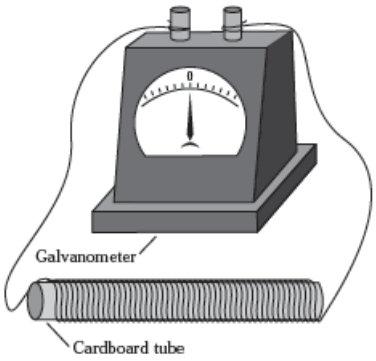
A. 1.0 A
B. 1.3 A
C. 1.5 A
D. 3.0 A

20. What is the voltage across the terminals of a 23 Ω resistor that has 0.065 A of current flowing through it?
    A. 0.0028 V
    B. 0.097 V
    C. 1.5 V
    D. 350 V

21. The diagram below shows a simple electric circuit.

    Which of the following statements describes the function of the battery?
    A. It reduces the flow of electrons.
    B. It transmits light through the circuit.
    C. It pushes electrons through the circuit.
    D. It releases light during a chemical reaction.

22. The diagram below shows copper wire wrapped around a cardboard tube, which is then attached to a galvanometer. A galvanometer detects and measures small amounts of electric current.



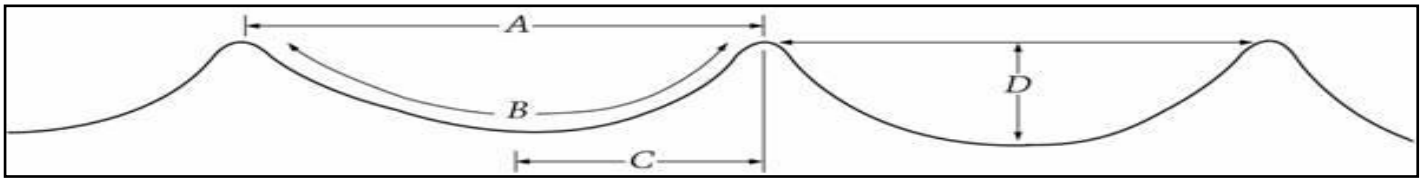
    Which of the following would cause the galvanometer needle to move?
    A. wrapping additional wire around the tube
    B. uncoiling the wire wrapped around the tube
    C. moving a magnet back and forth inside the tube
    D. moving an aluminum block up and down inside the tube

23. Which of the following actions would increase the current through a circuit component?
    A. decreasing the power in the component
    B. increasing the resistance of the component
    C. increasing the voltage across the component
    D. placing another identical component in series in the circuit

24. A microwave oven uses 10 A of current when connected to a wall outlet that provides 120 V of electricity. What is the resistance of the microwave oven?
    A. 0.083.Ω
    B. 12Ω
    C. 110Ω
    D. 1200Ω

25. A person produces two sound waves with a flute, one immediately after the other. Both sound waves have the same pitch, but the second one is louder. Which of the following properties is greater for the second sound wave?
    A. Frequency
    B. Amplitude
    C. Wavelength
    D. Speed in air

26. The figure below shows some ocean waves. Which of the labeled distances represents the wavelength?



    A. *A*
    B. *B*
    C. *C*
    D. *D*

27. The source of a sound is moving away from an observer who is standing still. How do the sound waves received by the observer compare with those emitted by the source?
    A. They are heard as having a greater velocity.
    B. They are heard as having a higher frequency.
    C. They are heard as having a lower frequency.
    D. They are heard as having a smaller wavelength.

28. Which of the following is a main factor that affects the speed of a wave?
    A. the pitch of sound
    B. the loudness of sound
    C. the amplitude of the wave
    D. the properties of the medium

29. Which of the following graphs best represents the relationship of the frequency of an electromagnetic wave to its wavelength?

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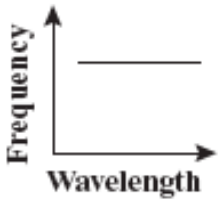
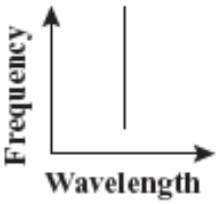
A.



B.



C.

D.

30. Which of the following waves travels fastest?
    A. water waves in oceans
    B. seismic waves in rocks
    C. sound waves from a violin string
    D. electromagnetic waves from the Sun