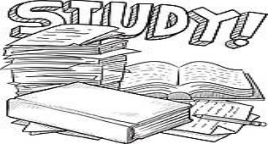
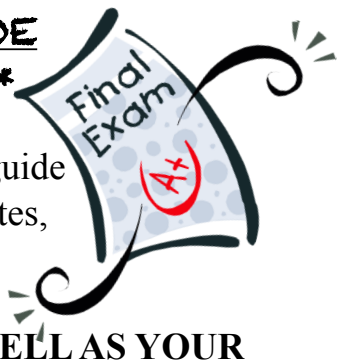


SEMESTER 1 FINAL EXAM STUDY GUIDE

FINAL EXAM: WEDNESDAY DEC. 20



Instructions: Use a separate sheet of paper to complete this study guide to help you review these concepts. You should also review your class notes, homework and class works for the content we have studied:
The Nature of Science, Motion, Forces, and Energy

****YOU WILL BE ABLE TO USE THIS STUDY GUIDE AS WELL AS YOUR SCIENCE NOTEBOOK!!****

IMPORTANT CONCEPTS TO KNOW AND UNDERSTAND:

1) How do you calculate average? Find the average of these data: 21m, 23m, 24m, 13m & 21m
2) What are outliers and what do you do with them when you find them in your data?
3) Identify the outlier in question #1 above.
4) Determine how to round to the nearest 10^{th}. Round these numbers to the nearest 10^{th}: 5.69, 1.02, 54.33, 1.98
5) Know how to read and the units of measurements for: Triple-beam balance, metric ruler, graduated cylinder.
6) Know how to identify the manipulated and responding variable in an experiment.
7) Be able to find mistakes in a data table or graph.
8) Identify the testable question in an experiment.
9) How do you find the SPEED of a moving object? Write the formula to calculate speed (velocity)?
10) How do you know when an object is in motion?
11) What 2 pieces of information do you need to know to determine the velocity of an object?
12) What types of objects make good reference points?
13) What are the three ways an objects motion can change (accelerate)?
14) Explain Newton's first law of motion and how mass affects inertia.
15) Explain Newton's second law of motion and how changing one of the variables affects the other.
16) Explain Newton's third law of motion. What does the phrase "equal and opposite" mean in your own words?
17) Describe the relationship between mass and the amount of force needed to stop or start an object.
18) Explain how the POSITION of an object affects the amount of POTENTIAL ENERGY it has.
19) DRAW an energy system diagram and EXPLAIN how a change in motion causes a change in energy.
20) Explain how energy is transferred from one object to another (where the energy goes).
21) What happens to an object when the forces are UNBALANCED?
22) What happens to an object when the forces are BALANCED?

23) Forces are vectors, which means they are described by their _____ and _____
24) DRAW an example of a BALANCED force (include #'s and arrows); DRAW an example of an UNBALANCED force (include #'s and arrows)
25) DRAW or EXPLAIN what must happen in order for a net force to equal zero.
26) Describe what 2 effects friction has on all moving objects
27) If an object is in motion, what force acts in the opposite direction, to slow it down?

IMPORTANT VOCABULARY TO KNOW:

Define the following:

A. MANIPULATED VARIABLE
B. RESPONDING VARIABLE
C. QUALITATIVE OBSERVATION
D. QUANTITATIVE OBSERVATION
E. INFERENCE
F. HYPOTHESIS
G. GRAVITATIONAL POTENTIAL ENERGY
H. KINETIC ENERGY
I. INERTIA
J. FORCE
K. VELOCITY
L. ELASTIC POTENTIAL ENERGY
M. MOMENTUM
N. REFERENCE POINT
O. FRICTION
P. ENERGY
Q. GRAVITY

PS2.A: Forces and Motion

- For any pair of interacting objects, the force exerted by the first object on the second object is equal in strength to the force that the second object exerts on the first, but in the opposite direction (Newton's third law). (MS-PS2-1)
- The motion of an object is determined by the sum of the forces acting on it; if the total force on the object is not zero, its motion will change. The greater the mass of the object, the greater the force needed to achieve the same change in motion. For any given object, a larger force causes a larger change in motion. (MS-PS2-2)
- All positions of objects and the directions of forces and motions must be described in an arbitrarily chosen reference frame and arbitrarily chosen units of size. In order to share information with other people, these choices must also be shared. (MS-PS2-2)

PS3.A: Definitions of Energy

- Motion energy is properly called kinetic energy; it is proportional to the mass of the moving object and grows with the square of its speed. (MS-PS3-1)
- A system of objects may also contain stored (potential) energy, depending on their relative positions. (MS-PS3-2)

PS3.B: Conservation of Energy and Energy Transfer

- When the motion energy of an object changes, there is inevitably some other change in energy at the same time. (MS-PS3-5)

PS3.C: Relationship Between Energy and Forces

- When two objects interact, each one exerts a force on the other that can cause energy to be transferred to or from the object. (MS-PS3-2)

ETS1.A: Defining and Delimiting Engineering Problems

- The more precisely a design task's criteria and constraints can be defined, the more likely it is that the designed solution will be successful. Specification of constraints includes consideration of scientific principles and other relevant knowledge that are likely to limit possible solutions. (MS-ETS1-1)

ETS1.B: Developing Possible Solutions

- A solution needs to be tested, and then modified on the basis of the test results, in order to improve it. (MS-ETS1-4)
- There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem. (MS-ETS1-2), (MS-ETS1-3)
- Sometimes parts of different solutions can be combined to create a solution that is better than any of its predecessors. (MS-ETS1-3)
- Models of all kinds are important for testing solutions. (MS-ETS1-4)

ETS1.C: Optimizing the Design Solution

- Although one design may not perform the best across all tests, identifying the characteristics of the design that performed the best in each test can provide useful information for the redesign process—that is, some of those characteristics may be incorporated into the new design. (MS-ETS1-3)
- The iterative process of testing the most promising solutions and modifying what is proposed on the basis of the test results leads to greater refinement and ultimately to an optimal solution. (MS-ETS1-4)
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