TSOKOS READING ACTIVITY

Section 2-10

1. Essential Idea: Motion may be described and analyzed by the use of graphs and equations.

2. Nature Of Science: Observations: The ideas of motion are fundamental to many areas of physics, providing a link to the consideration of forces and their implication. The kinematic equations for uniform acceleration were developed through careful observations of the natural world.

3. International-Mindedness: International cooperation is needed for tracking shipping, land-based transport, aircraft and objects in space.

4. Theory Of Knowledge:

   a. The independence of horizontal and vertical motion in projectile motion seems to be counter-intuitive.

   b. How do scientists work around their intuitions?

   c. How do scientists make use of their intuitions?

5. Understandings:

   a. Projectile motion

   b. Fluid resistance and terminal speed

6. Applications And Skills:

   a. Analyzing projectile motion, including the resolution of vertical and horizontal components of acceleration, velocity and displacement.

   b. Qualitatively describing the effect of fluid resistance on falling objects or projectiles, including reaching terminal speed.

7. Guidance:

   a. Calculations will be restricted to those neglecting air resistance.

   b. Projectile motion will only involve problems using a constant value of g close to the surface of the Earth.

   c. The equation of the path of a projectile will not be required.

8. Data Booklet Reference:

   a. $v = u + at$

   b. $s = ut + \frac{1}{2}at^2$

   c. $v^2 = u^2 + 2as$

   d. $s = \frac{(v+u)t}{2}$

9. Utilization:

    a. Diving, parachuting and similar activities where fluid resistance affects.

    b. The accurate use of ballistics requires careful analysis.

    c. Quadratic functions (see Mathematics HL sub-topic 2.6; Mathematics SL sub-topic 2.4; Mathematical studies SL sub-topic 6.3).

    d. The kinematic equations are treated in calculus form in Mathematics HL sub-topic 6.6 and Mathematics SL sub-topic 6.6.

10. Aims:

    a. Aim 2: much of the development of classical physics has been built on the advances in kinematics

    b. Aim 6: experiments, including use of data logging, could include (but are not limited to): determination of g, estimating speed using travel timetables, analyzing projectile motion, and investigating motion through a fluid

    c. Aim 7: technology has allowed for more accurate and precise measurements of motion, including video analysis of real-life projectiles and modeling/ simulations of terminal velocity

11. Read section 2-1, pg. 45-53 in your textbook.

12. Draw (or create) two pictures showing the concepts listed below. ***Label your pictures with <u>all 10 of the points listed below</u> and <u>give all appropriate equations for x and y positions and for time t</u>.***

    a. Object rolling off the top of a building.

        i. a_x v. x_0 ix. v_x

        ii. a_y vi. x x. v_y

        iii. y_0 vii. v_{x0}

        iv. y viii. v_{y0}

    b. Object launched at an arbitrary angle from the horizontal and following a parabolic path.

        i. a_x vi. x xi. v_y

        ii. a_y vii. v_0 xii. $y = 0$ (2 places)

        iii. y_0 viii. v_{x0} xiii. $v_y = 0$

        iv. y ix. v_{y0}

        v. x_0 x. v_x

13. Answers may be typed or neatly printed. Drawings may be freehand, but try to make use of the 'Shapes', 'Insert Clipart" or "Insert Picture" functions of MS Word and utilize the "Text Box" function to add labels to your diagrams. It would also be really cool if you used the MS Equations function to type your equations. If you submit this assignment electronically, the filename must be in the following format, "LastnameFirstinitialPerXReadActX-X". Bonus points for depicting Canadien drivers or anything having to do with France.