MATRIC REVISION

MATRIC REVISION 2008

education
Department:
Education
REPUBLIC OF SOUTH AFRICA

TOP TIPS FROM THE EXPERTS: EDITION 5 OF 13

PHYSICAL SCIENCES PAPER 1

The formula for Science success

POINTS TO PONDER: The matrics of Westbury High School in Westbury debate some of the scientific laws of the universe

Good luck message

Celebrity hola!

Shugasmarx of Sizwatta Kamp

Study hard, be well prepared and no matter how tough it seems always keep your head up and let your positive thoughts of a prosperous future conquer.

MEET OUR SCIENCE EXPERT

Veena Maharaj

SCIENCE SUSS: Veena Maharaj, Chief Education Specialist for Physical Sciences at the national Department of Education, gives you the low-down on how to tackle your first Science paper

Ms Veena Maharaj matriculated at Tongaat High School in KwaZulu-Natal. She graduated with a BSc degree at the University of Durban Westville in 1982. Her majors were Physics and Mathematics. She qualified as a teacher in 1985 after obtaining the UHDE qualification in education. She studied School Management and Educational Law at Rand Afrikaans University, where she obtained her Further Diploma in Education Management. She obtained her MEd degree in Physics Education in 2004.

Veena taught Physical Science, Mathematics and Computer Studies, Grades 10 to 12, during a teaching career that spanned 16 years. She served as Head of Department for Physical Sciences before she was promoted to Subject Advisor for Physical Sciences in Kwazulu-Natal. She also served as executive member of the National Standards Body for Mathematical, Physical, Computer and Life Sciences. She is currently the Chief Education Specialist for Physical Sciences at the national Department of Education.

NEXT WEEK : MATHEMATIC LITERACY

The Physical Sciences examination consists of two papers – Paper 1: Physics (3 hours, 150 marks) and Paper 2: Chemistry (3 hours, 150 marks). This issue of "Matric Revision: Top Tips from the Experts" provides you with guidance for Paper 1.

Before you leave home ensure that you have your pens, pencils, ruler, mathematical instruments and a non-programmable scientific calculator. Be in the examination room 30 minutes before the starting time and relax.

Read all the instructions and information provided before you start answering the question paper. You may be asked to answer certain questions on an ANSWER SHEET, in an ANSWER BOOK or on GRAPH PAPER. Make sure you write your examination number on all of these when you receive them in the examination room.

You have 180 minutes for 150 marks. A good rule of thumb is to spend approximately 1 minute per mark – this will leave you with enough time to check your work at the end of the exam.

Make sure you number your answers exactly as the questions are numbered. Answer the questions you are confident about first and quickly. You can come back to difficult questions later. Do not get bogged down on a question you find difficult to answer – you will lose valuable time that could be spent on questions you know.

There are two sections in the paper: Section A and Section B: Section A has four questions worth a total of 35 marks. Spend about 35 minutes on this section. Section B is worth 115 marks. Spend about 135 minutes on this section.

Finally spend 10 minutes checking through your answers. Make sure you have answered all the questions.

Data sheets

Use the data sheet provided with the examination paper. Know the values of constants – for example, the value for "g" will be 9,8 m·s^{-2}.

General study tips

When preparing for the exam, do as many practise examples as possible. Read the explanations of concepts and laws, and then answer as many exercises, questions and exemplar papers as you can find. WRITE down your solutions to these. You should also practise answering questions that require you to draw graphs – and make sure you actually DRAW the graphs. Remember, practice makes perfect!

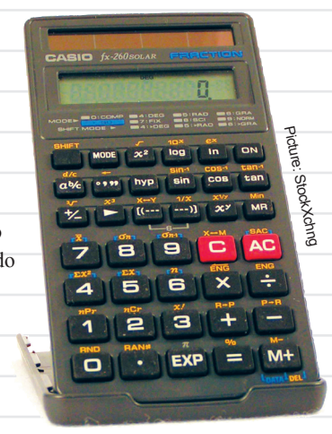
When solving problems, remember to do the following:

- Make a sketch if it is not given (do not draw fancy pictures);
- Write down the information that is given in the question; and
- Write down what you need to find.

Formulas and substitutions

If a question requires you to do a calculation using a formula, do the following:

- Write down the formula you are using;
- Show the substitution of values in the formula(s);
- Do the calculation; and
- Write the unit in the final answer.



Picture: StockXchng

Drawing graphs

Label the axes correctly.

SECTION A

This section has four questions: one-word items, matching items, true/false items and multiple-choice items. Remember, in the true/false questions, if you say a statement is false, you then need to *provide the correct answer.*

SECTION B

This section consists of long questions.

Here are some specific tips:

1. Vertical projectile motion

- If an object is dropped or thrown downward, remember to write the sign convention that you are using in your answer – e.g. down (+) and up (-).
- Remember that displacement, velocity, force, momentum and acceleration will have to follow the sign convention since all these physical quantities are vectors.
- If you decide to change your sign convention from one problem to another, remember to state this in your answer.
- The magnitude of the acceleration due to gravity is: g=9.8 m·s^{-2}.
- If an object is thrown upward and if, according to the sign convention, you take up as (+) then g= - 9.8 m·s^{-2} since g is a vector.
- Always interpret your answers with respect to the sign convention used for the problem
- When drawing graphs of motion, follow the sign convention (either the one given by the examiner or, if one is not specified, then the one you have chosen). Remember the following:
  - The slope of x-t tells us about the velocity (vector); and
  - The slope of v-t tells us about the acceleration (vector).
- Write down the unit for the final answer to a calculation.

2. Momentum and impulse

- Remember that momentum and impulse are vectors: sign convention (e.g. take east as positive, etc) is therefore vital.
- Remember that impulse is the change in momentum and that it is a vector quantity.
- If your answer is a vector, indicate the direction as well as the magnitude – for example, p = 67 Kg m·s-1, west.
- Interpretation of answers is also necessary.

3. Work, energy and power

- In the absence of friction, tension and air resistance, etc, mechanical energy will be conserved – i.e. $K_1+U_1=K_2+U_2$
- If other forces are present, use $W + K_1+U_1=K_2+U_2$, where W is the work done by other forces.
- For inclined plane problems (θ is the angle between the inclined plane and the horizontal), remember that the component of the weight acting down the plane is Wsinθ; and the component of the weight acting perpendicular to the plane (exerted on the object) is Wcosθ.

4. Frames of reference

- Remember that in this section you are working with velocity vectors.
- From the problem you will have to identify and give labels to the relative velocities – e.g. "The velocity of a train with respect to the ground is 12 m.s-1 east." This implies that v_{TG} = 12 m.s^{-1} east.
- Remember that the velocity vectors can be added using either the parallelogram method (using the cosine and sine rule) or by using the method of components.

Waves, sound and light

The Doppler effect

- Draw a rough sketch if this is not provided. This helps. Write down the given information on your sketch.
- In the equation $f_L = \frac{v \pm v_L}{v \pm v_s} f_s$.
  - For the numerator (), use (+) if the **listener** is moving towards the source and (–) if the **listener** is moving away from the source.
  - For the denominator ($v \pm v_s$), use (+) if the **source** is moving away from the listener and (–) if the source is moving towards the listener.

  This equation includes all possibilities for the motion of the source and listener (relative to the medium) along the line joining them. If the listener happens to be at rest in the medium, v_L is zero. If both the source and the listener are at rest or have the same velocity relative to the medium, then $v_L = v_S$ and $f_L = f_S$.
- Remember that the Doppler effect can be applied to an accelerating object – e.g. a bungee jumper. Here you may have to combine some projectile motion with Doppler.

Electricity and Magnetism

1. AC generators

- Remember the direction of the induced current in the loop can be found using Fleming's Right Hand Rule (g in right hand - generator).
- Be able to differentiate between split-rings and slip-rings.

2. Capacitance

- The capacitance of a capacitor is construction dependant, i.e. the area of the plates, separation distance and material between the plates (dielectric).
- If the voltage across a capacitor increases, the charge increases so that the capacitance remains constant and vice-versa.
- The impact of the dielectric is to reduce the electric field, decrease the voltage across the plates and hence increase the capacitance.
- Capacitors in series are likened to resistors in parallel and vice-versa.

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