



EXAMINATIONS AND ASSESSMENT CHIEF DIRECTORATE

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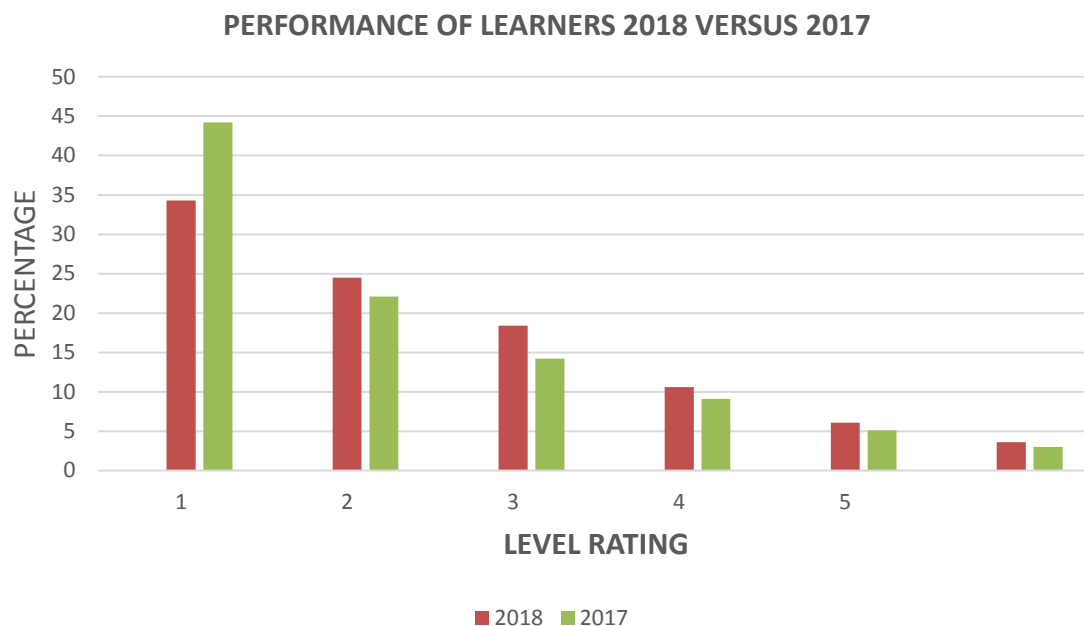
2018 NSC CHIEF MARKER'S REPORT

SUBJECT:	PHYSICAL SCIENCES
PAPER:	1
DURATION OF PAPER:	3 HOURS
DATES OF MARKING:	30 NOVEMBER 2018 – 14 DECEMBER 2018

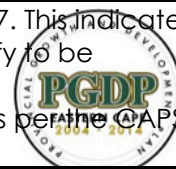
SECTION 1: (General overview of Learner Performance in the question paper as a whole)

Generally, learners performed fairly, the pass rate overall is 65.4%. There has been an improvement over 2017 which was 55,8%.

LEVEL RATING		1	2	3	4	5	6	7
PERCENTAGE	2018	34.6	24.5	18.4	10.6	6.1	3.6	2.4
	2017	44.2	22.1	14.2	9.1	5.1	3.0	2.3



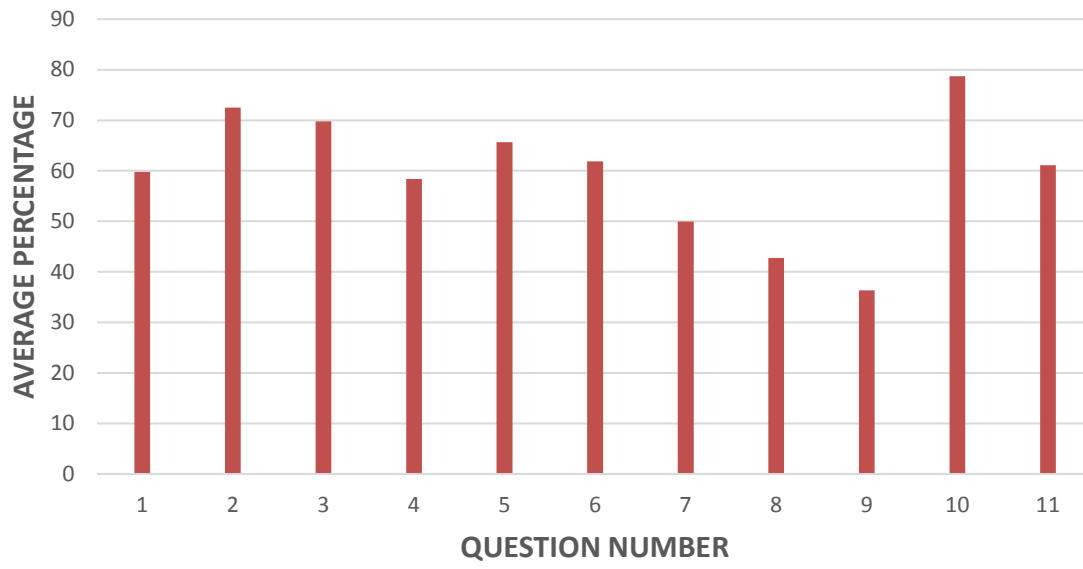
- The quality of results is not encouraging. 22,7% of the learners obtained level 4 to 7. This indicates that only 22,7% of the learners who sat for the 2018 NSC in the Eastern cape qualify to be admitted into the Universities.
- The question paper was of good standard. The cognitive levels were balanced as per the CAPS Policy document. There is still a lot to be done to improve quality passes.



The performance per question according to the RASCH report is also indicated below.

QUESTION NUMBER	1	2	3	4	5	6	7	8	9	10	11
AVERAGE PERCENTAGE	59.8	72.53	69.77	58.36	65.69	61.85	49.95	42.73	36.33	78.73	61.08

LEARNERS PERFORMANCE



SECTION 2: Comment on candidates' performance in individual questions

(It is expected that a comment will be provided for each question).

QUESTION 1 (59.80%)																																
(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?																																
<p>This question was answered fairly with increase of 8% over the percentage of last year. However there are still concepts that learners are struggling with. 1.8 was the worst answered sub-question. The concept of electric circuits is still a challenge to learners. 1.7 was the best answered sub-question in question 1. This was a question on Waves Sound and Light.</p> <p>Question 1.1 was also well answered. This could be because there were two options that were correct for this question.</p>																																
QUESTION NUMBER	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10																						
AVERAGE %	80	42	79	42	65	64	89	16	71	50																						
<table border="1"> <caption>QUESTION 1 - Average Percentage by Sub-Question</caption> <thead> <tr> <th>Sub-Question</th> <th>Average Percentage</th> </tr> </thead> <tbody> <tr><td>1.1</td><td>80</td></tr> <tr><td>1.2</td><td>42</td></tr> <tr><td>1.3</td><td>79</td></tr> <tr><td>1.4</td><td>42</td></tr> <tr><td>1.5</td><td>65</td></tr> <tr><td>1.6</td><td>64</td></tr> <tr><td>1.7</td><td>89</td></tr> <tr><td>1.8</td><td>16</td></tr> <tr><td>1.9</td><td>71</td></tr> <tr><td>1.10</td><td>50</td></tr> </tbody> </table>											Sub-Question	Average Percentage	1.1	80	1.2	42	1.3	79	1.4	42	1.5	65	1.6	64	1.7	89	1.8	16	1.9	71	1.10	50
Sub-Question	Average Percentage																															
1.1	80																															
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1.10	50																															

(b) Why the question was poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

The question that was the worst answered was Question 1.8 which is an electric circuit question. Learners did not identify the difference between current flow through a series circuit and through a parallel circuit. This is work from previous grades and should be mastered by grade 12. The learners lack the skill of answering Multiple Choice questions as well as their inability to eliminate incorrect choices, leads them to guessing the answers.

(c) Provide suggestions for improvement in relation to Teaching and Learning

Teachers need to set their own MCQ question papers for class tests. The only time that the learners have to answer these type of questions, is during examinations. If the teacher sets MCQ regularly, they can easily test the learner's knowledge in a test that can be marked quickly. The learners then get feedback quicker. It is also advisable to expose the learners to different levels of MCQ. Learners that have a good knowledge of the content tend to answer MCQ better.

(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

During teacher development, teachers need to be provided with tools so that they can set up test papers that contain MCQ-type questions.

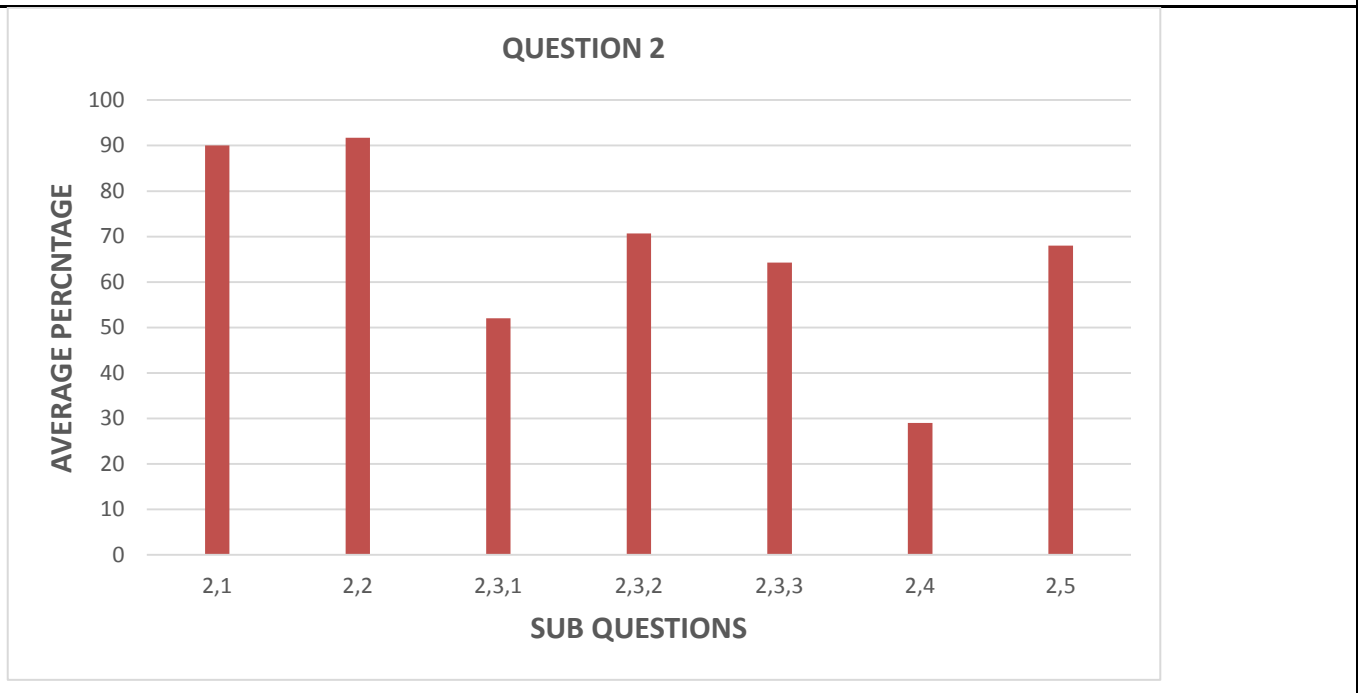
Teachers need to obtain the multiple choice booklet and develop short tests from this booklet (but change the values in the questions) and thereby effectively train learners to answer multiple choice questions.

QUESTION 2 (72.53%)

(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?

This was the second best answered question after question 10. However 2.4 was poorly answered.

QUESTION NUMBER	2.1	2.2	2.3.1	2.3.2	2.3.3	2.4	2.5
AVERAGE PERCENTAGE	90	91,75	52	70,67	64,25	29	68



(b) Why the question was poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

Marks were unnecessary lost because learners could not state Newton's Second Law and could also not draw a free-body diagram. The ability to use $F_{\text{net}} = ma$ has improved.

Learners could not state the "reason" asked in Question 2.5.

Learners found it difficult to relate the angle of inclination of the applied force to the normal force and the kinetic frictional force. It is worrying that learners are not aware of this relationship.

(c) Provide suggestions for improvement in relation to Teaching and Learning

Learners seem to understand the topic of forces better. However, when questions are asked in a different way, they tend to get confused. They need to improve their problem-solving ability.

The identifying of forces acting on an object should be taught in grade 11 and grade 12 learners should not find that part the question so challenging.

(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

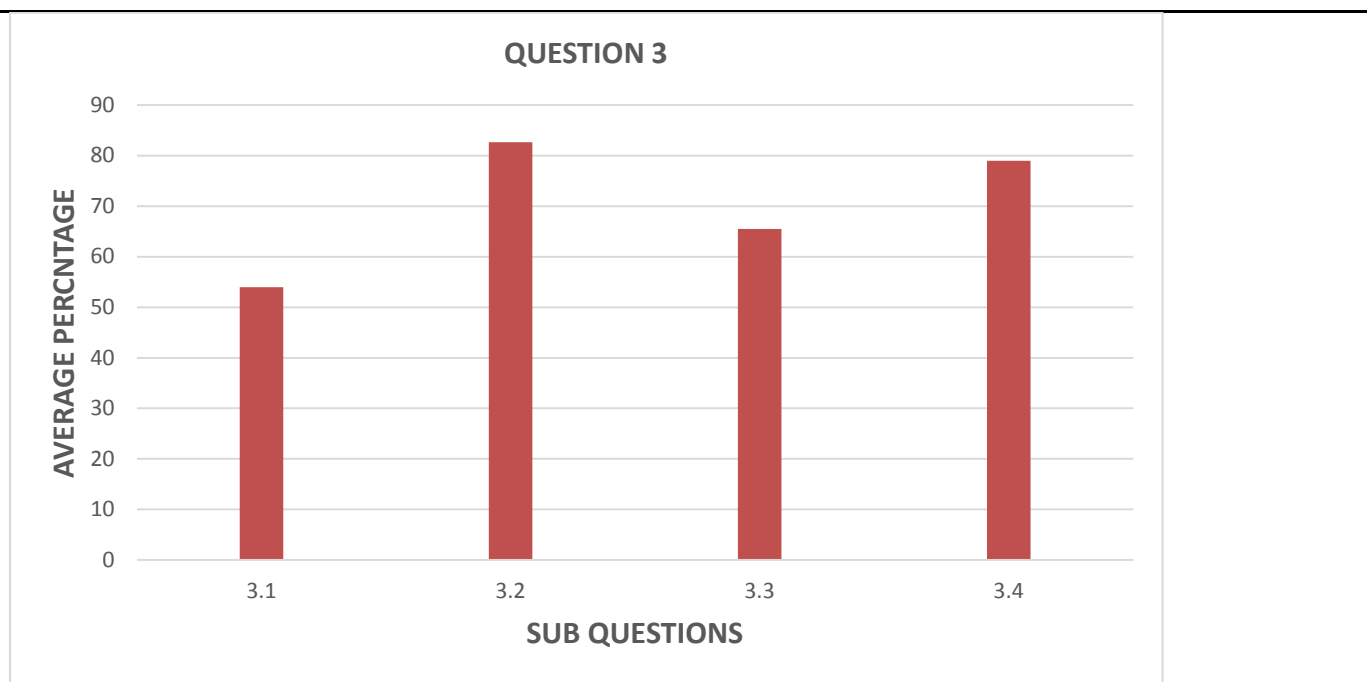
It is concerning that the learners seem to struggle with that part of the work that was done in Grade 11. Enough revision should have been done on this work before the learner starts Grade 12.

QUESTION 3 (69.77%)

(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?

In general this question was fairly answered. However 3.1 was poorly answered with an average percentage of 54%.

QUESTION NUMBER	3.1	3.2	3.3	3.4
AVERAGE PERCENTAGE	54	82.67	65.5	79



(b) Why the question was poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

Learners seem to be unaware of all the forces acting on an object which is in vertical motion. They are not confident enough with identifying forces on an object and this is something that should be taught well in Grade 11. They do not understand that at the maximum height the velocity is $0 \text{ m}\cdot\text{s}^{-1}$.

(c) Provide suggestions for improvement in relation to Teaching and Learning

The question was set in an unfamiliar way. It was not difficult but presented the learner with a challenge to apply his knowledge. It was also difficult for the learners to make a deduction from the answer he obtained in Quest 3.3. The learner has to understand the meaning of an answer that he obtains after using an equation of motion.

The drawing of a graph of motion using calculated values still seems to be problematic. This is part of the syllabus in Grade 10 and learners should have more confidence in drawing and understanding graphs of motion.

(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

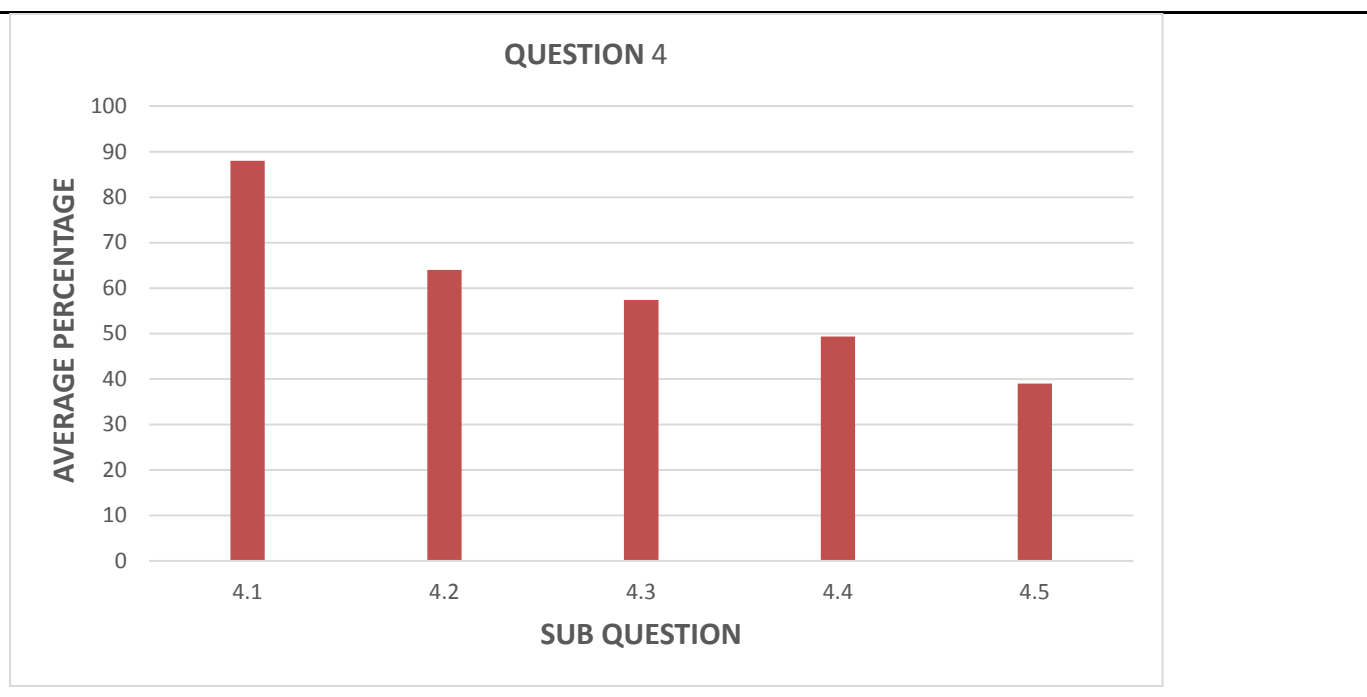
If a learner has a good understanding of Grade 11 work, then the application of that knowledge will help him. Teachers need to make sure that Grade 11 work is understood so that it can be applied in Grade 12.

QUESTION 4 (58,38%)

(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?

This was poorly answered considering the fact that Momentum and Impulse is not a challenging topic and the fact that the questions were asked at cognitive level 1 to 3 and only easy to medium in terms of the level of difficulty.

QUESTION NUMBER	4.1	4.2	4.3	4.4	4.5
AVERAGE PERCENTAGE	88	64	57.4	49.33	39



(b) Why the question was poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

Most learners could not comprehend that 3 objects were used of which one of the masses was unknown. Learners do not understand the difference between Conservation of momentum and Change in momentum when having to apply these concepts. Learners did not comprehend the fact that all 3 objects were initially at rest. This caused a problem in the answering of the rest of the question.

(c) Provide suggestions for improvement in relation to Teaching and Learning

Learners must be taught:

- To identify the correct formula to be used from the Data Sheet.
- To correctly substitute the values into the formula and not attempt to change the subject of the formula.
- To understand what their answer represents.

(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

Learners need to be taught the specific differences between Conservation of momentum ($\Sigma p_i = \Sigma p_f$) and Change in momentum (Δp). They get confused with the fact that Σp_i has to do with **the sum of** the momentum of different objects and that Δp has to do with the **difference** in momentum of an object. Allowing the learners to solve problems in which both these concepts occur, will help. Teachers need to have a good knowledge of this content is of uttermost importance.

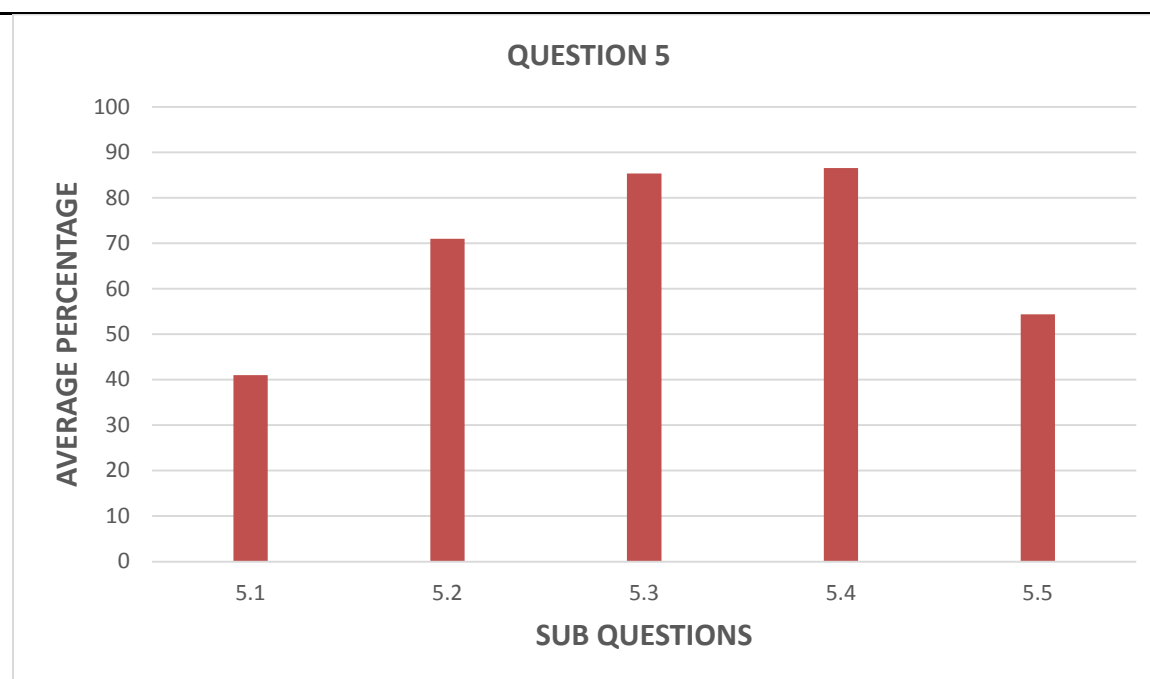
Candidates were also confused about what values to use for v_i and v_f . Such basics should be well-taught in Grade 10 and Grade 11. It should not be a problem for Grade 12 learners to use equations of motion correctly.

QUESTION 5 (65,69%)

(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?

This question was fairly answered considering the fact that Work Energy and Power has been a challenging topic in the past and especially compared to last year where the average percentage was 28,5%.

QUESTION NUMBER	5.1	5.2	5.3	5.4	5.5
AVERAGE PERCENTAGE	41	71	85.33	86.5	54.4



(b) Why the question was poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

In this question (Question 5.3) learners had to identify a formula from the Data sheet and substitute the given values into the formula. Many learners could not identify the formula.

Question 5.5 was more challenging. Learners then also failed to indicate the positive and negative directions. The learner had to apply Energy Principles and this still remains a challenge to most of the learners. They struggle to identify the forces that act on an object to do work. The question clearly stated that **energy principles** had to be used. Many learners tried to use other equations/formulae to solve the problem.

(c) Provide suggestions for improvement in relation to Teaching and Learning

When teaching definitions to the learners, the teacher need to emphasize the key words that need to be include in the definition so that it is in the correct context. Learners must understand that they are working with vectors and that indicating directions is important.

(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

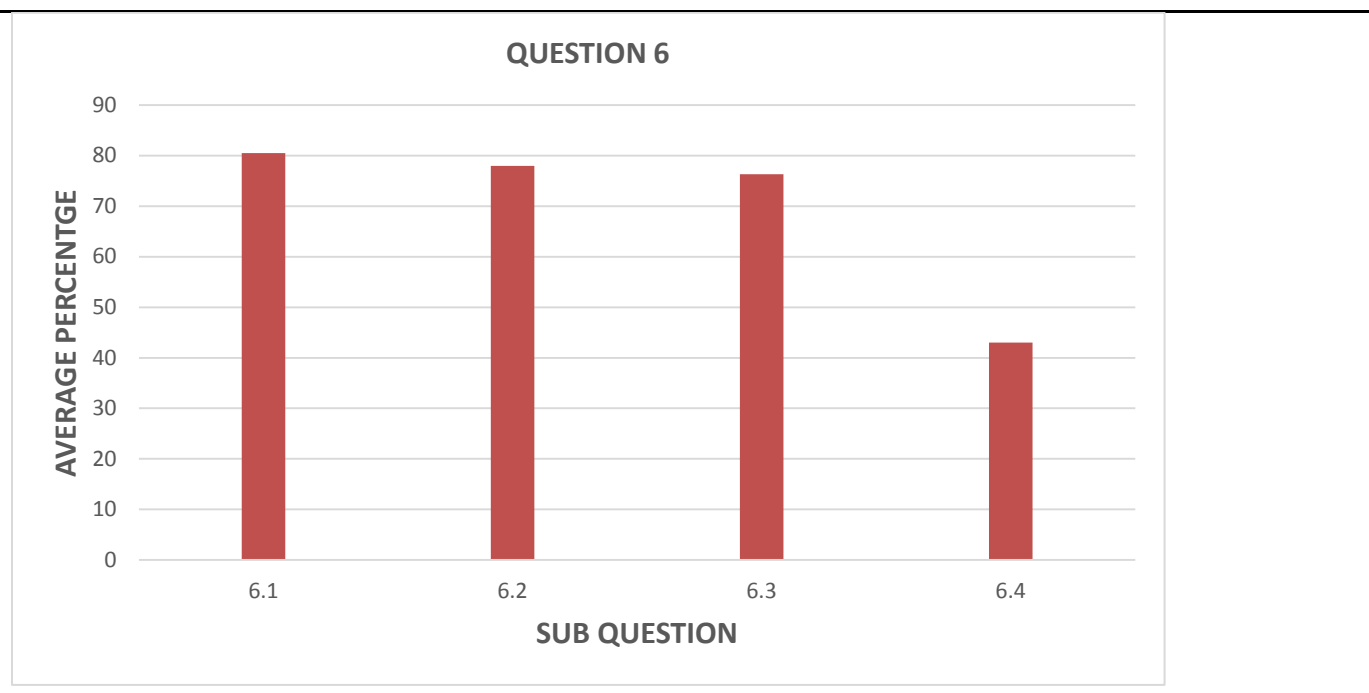
The correct use to subscripts needs to be emphasized by teachers. The basic knowledge of forces and in which direction they each act, will aid the learners in understand energy principles.

QUESTION 6 (61,85%)

(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?

This question was not answered well considering the fact that Waves, Sound and Light is the easiest topic in the syllabus.

QUESTION NUMBER	6.1	6.2	6.3	6.4
AVERAGE PERCENTAGE	80.5	78	76.33	43



(b) Why the question was poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

The Doppler effect question was the most difficult question in the question paper.

Ques 6.1 and 6.2: These are recall questions. Learners should have obtained these marks.

Nevertheless, too many learners failed to get these marks.

Question 6.3: The learners struggled to realize that the wave equation ($v = \lambda f$) had to be used to find the frequency. Some tried to use the Doppler equation to solve the problem.

Question 6.4: Learners could not comprehend that the velocity had to be calculated first using the Doppler equation before calculating the distance.

(c) Provide suggestions for improvement in relation to Teaching and Learning

Question 6.1 is a recall question and all learners should get that correct.

The teachers need to teach the learners that the Doppler effect is linked to wave motion as well as motion involving the equations of motion.

(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

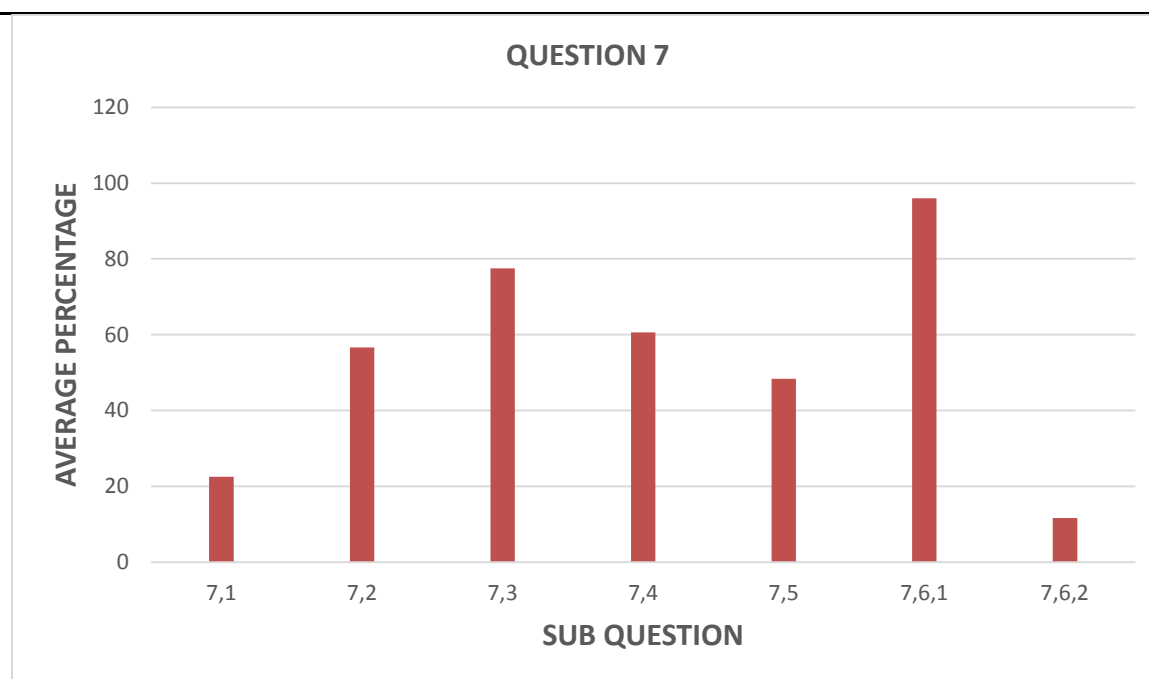
Learners who struggled with answering Question 6.3 had no chance of solving Question 6.4. The link between Wave motion and the use of equations of motion should be emphasized. Problems relating these themes should be provided to the learners.

QUESTION 7 (49,95%)

(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?

This performance in this question is very poor. Electrostatics is taught in grade 11 and it is expected that by grade 12 they should have mastered this topic yet it was amongst the worst performed questions.

QUESTION NUMBER	7.1	7.2	7.3	7.4	7.5	7.6.1	7.6.2
AVERAGE %	22.5	56.67	77.5	60.6	48.33	96	11.67



(b) Why the question was poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

This was the most difficult question in the Question paper.

Reasons:

- 1) 3 Charges were used instead of 2. This is something new to the learners.
- 2) The charges involved were firstly neutral, then charged, then allowed to touch and then separated. This was too many actions and the learners could not always figure out which action was required for a specific question. Question 7.6 (last section) referred to the second action (**after it was initially charged**). This was confusing.

Many learners knew they had to draw a sketch of 2 similar charges. However, they lacked the skill to identify and draw the correct electric field diagram.

In Questions 7.4 and 7.5, it was evident that learners do not know the difference between Electrostatic Force and Electric Field. The skill to use Pythagoras was also required in these sub-sections.

Question 7.6.2 was a Level 4 question. It was accepted that this question was to test the top learners' knowledge. However, many candidates tried to use gravitational force to calculate the increase in mass.

(c) Provide suggestions for improvement in relation to Teaching and Learning

Learners must know how to draw all electric field patterns correctly.

Attention must be given to explaining the difference between F_E and E .

Examiners (or the Department) should make it clear whether 3 charge questions need to be taught to the grade 12 learners.

(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

Regular short tests on the following specific areas of this section needs to be done:

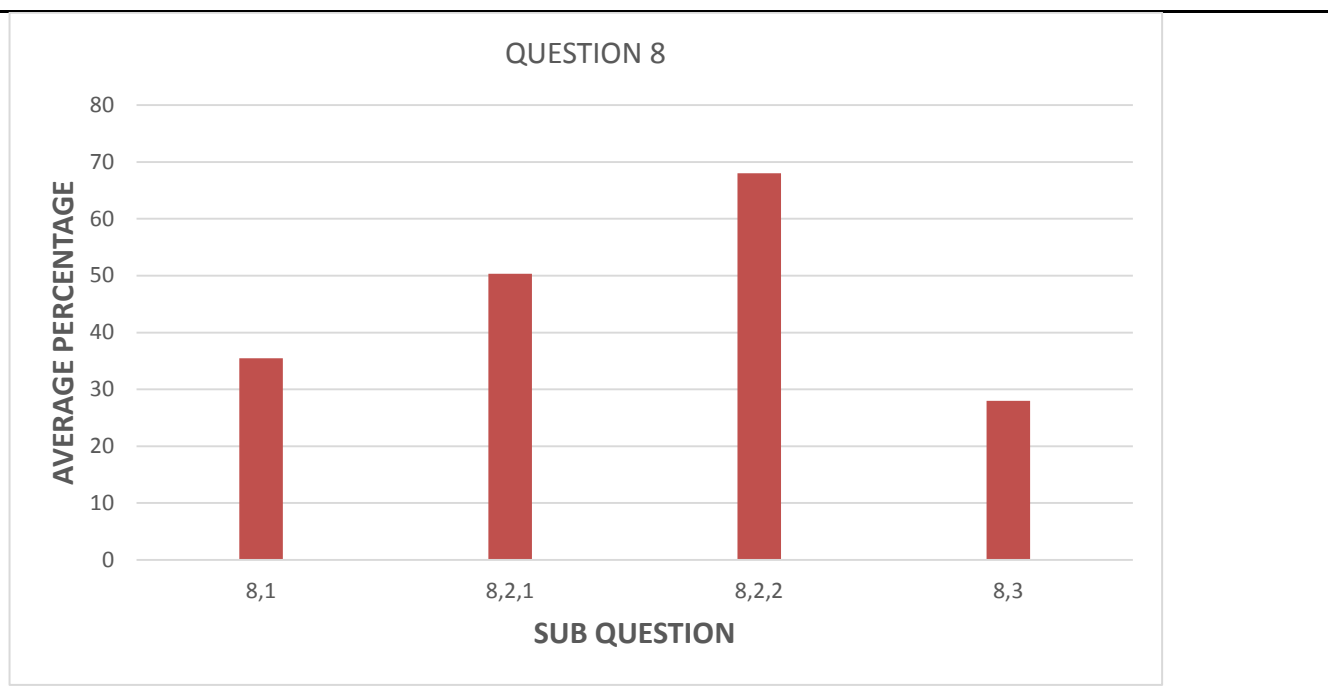
- 1) Electric field patterns and definitions.
- 2) Forces between charges.
- 3) Electric field strength at different distances from a charge.

QUESTION 8 (42,73%)

(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?

This question was the worst answered question after question 9. Both question 8 and 9 are on Electric circuits

QUESTION NUMBER	8.1	8.2.1	8.2.2	8.3
AVERAGE PERCENTAGE	35.5	50.33	68	28



(b) Why the question was poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

Learners did not know what emf is. They could not define it in terms energy. They were also unable to use the equation $E = I(R + r)$ correctly. They could not identify the correct formula from the data sheet.

(c) Provide suggestions for improvement in relation to Teaching and Learning

Learners should be exposed to different styles of questions.

They should also be provided with the Exam Guidelines so that they know exactly what they need to learn.

Enough remedial work and revision should be done one time. They must be encouraged to solve the problems on their own.

(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

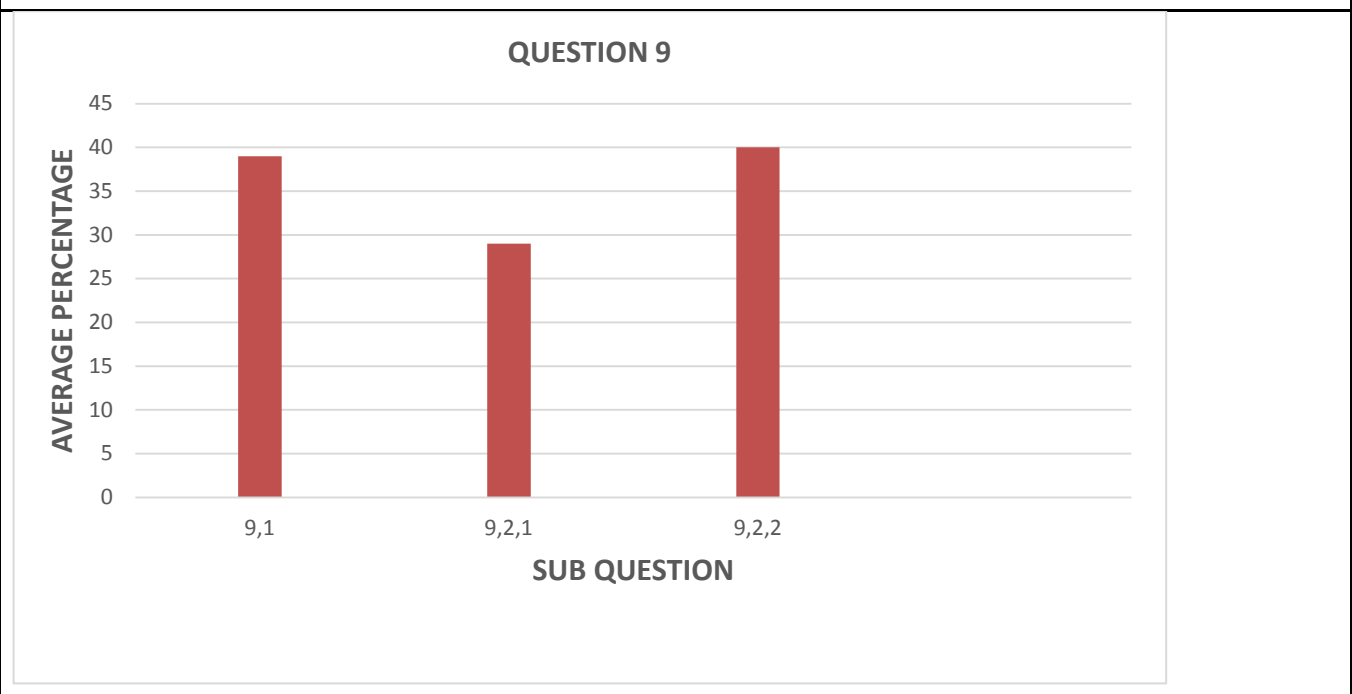
Make sure that the learners understand the Electricity section (Circuit diagrams) from grade 11. If they have a good understanding of this, then the Gr 12 syllabus should not be such a struggle. Learners still do not fully understand what is meant by potential difference, current strength and other electricity terms which are taught in Gr 11. They are therefore not aware of how the current flows, what the ammeter measures and what the voltmeter measures and how the internal resistance affects these readings.

QUESTION 9 (36,33%)

(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?

This was the worst performed question in the entire paper. Performance in all sub questions is below 50%.

QUESTION NUMBER	9.1	9.2.1	9.2.2
AVERAGE PERCENTAGE	39	29	40



(b) Why the question was poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

Learners struggled to use the graph.

Calculating the gradient, reading off coordinates and making a reading of the y-intercept were all problematic for learners. It would seem as if many learners cannot use the knowledge and skills acquired in Mathematics and apply it in Physical Sciences.

(c) Provide suggestions for improvement in relation to Teaching and Learning

Even though the learners are all supposed to do a practical on internal resistance, they still do not understand the concepts of emf and internal resistance. Many more Mathematics related questions should be given to the learners to do in order that they can see the relationship between Mathematics and Physical Sciences.

(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

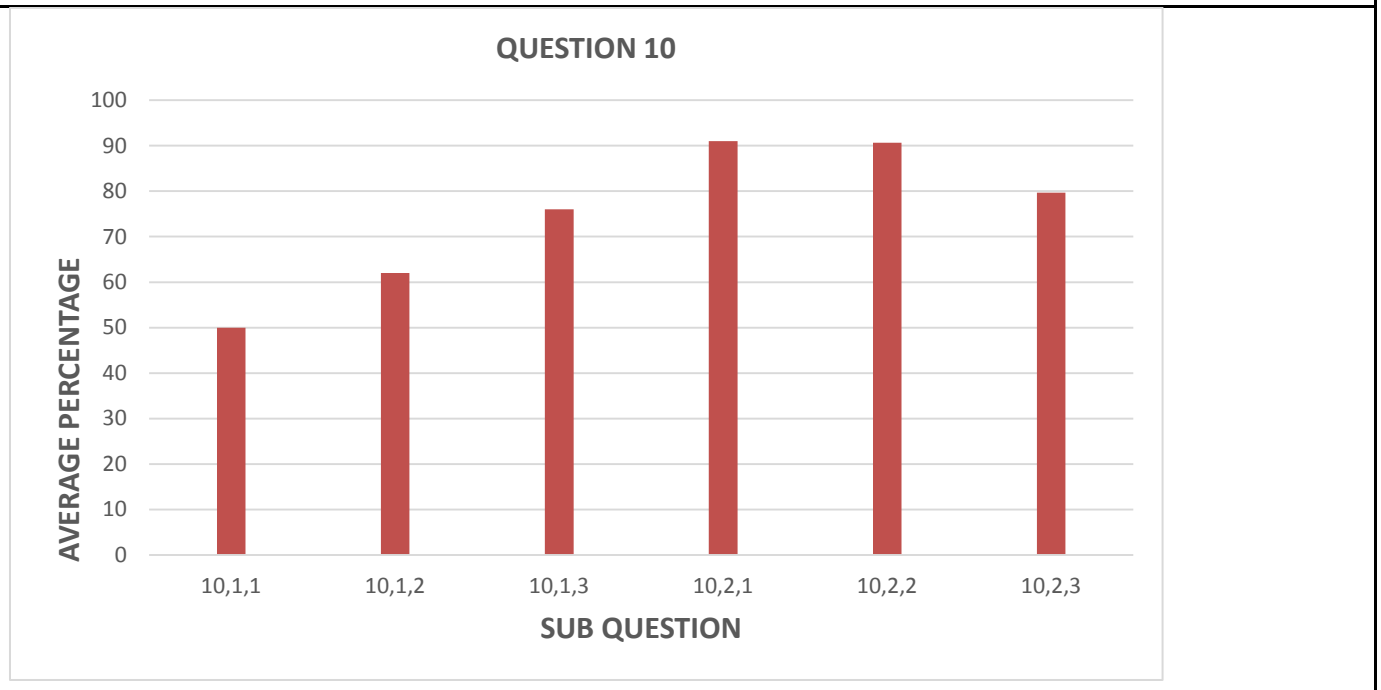
If the teachers can identify exactly what part of Mathematics skills a learner is struggling with, this can be conveyed to the Mathematics teacher to try and resolve.
Doing as many problem-solving questions will also help the learners understand the concepts better.

QUESTION 10 (78,73%)

(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?

This question was the best performed question in the entire question paper. However considering the fact that the topic electrodynamics is not a challenging topic, it means that more still need to be done.

QUESTION NUMBER	10.1.1	10.1.2	10.1.3	10.2.1	10.2.2	10.2.3
AVERAGE %	50	62	76	91	90.67	79.67



(b) Why the question was poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

In Question 10.1, which is a recall type question, the learners should have done better.

The mistakes made in Question 10.2 was due to the fact that learners do not quite comprehend the **rms** and **max** terms.

(c) Provide suggestions for improvement in relation to Teaching and Learning

Learners need to be taught what the subscripts mean when working with alternating current. They must understand the difference between **max** and **emf**. If they do not understand these terms, they will struggle with the whole section.

(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

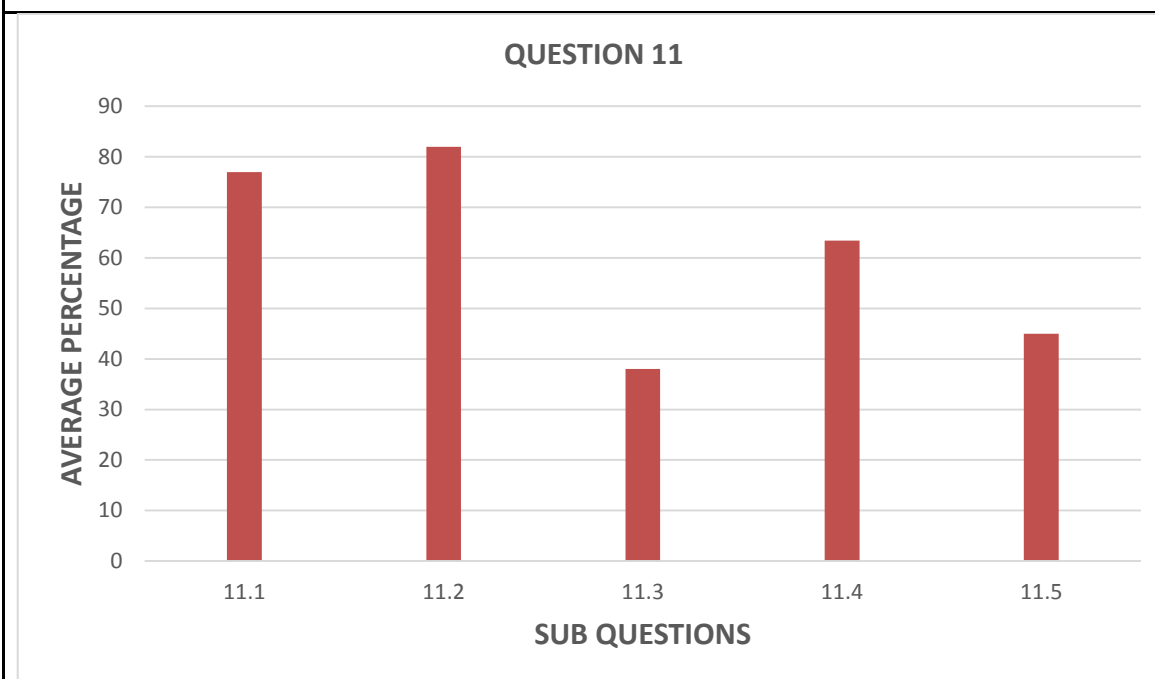
Appropriate sketches and demonstrations need to be done so that the learners understand this section of work. Providing the learners with question papers to work out before they fully comprehend the subject matter, will not help them. This is a new section of the work and it needs to be fully explained before learners attempt to tackle problem-solving exercises.

QUESTION 11 (61,08%)

(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?

Question 11 was fairly answered as compared to last year.

QUESTION NUMBER	11.1	11.2	11.3	11.4	11.5
AVERAGE %	77	82	38	63.4	45



(b) Why the question was poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

Learners seem to have a problem with understanding what "Work function" and "Threshold frequency" means. They therefore also struggle to apply/calculate these values in the given formulas. Since this question required the use of the exponential function on the calculator, learners found it challenging.

In Question 11.3 learners had to compare their answer to a given value and then make a deduction and this was a challenge. They seem to not have an understanding of what exactly they are/need to calculate.

Question 11.4 it was clear that many candidates

- Could not apply the Work function formula correctly.
- Struggled to use their calculator correctly.

(c) Provide suggestions for improvement in relation to Teaching and Learning

Learners need to understand what the Photo-electric effect means and how it applies to everyday living.

It was also evident in this question that candidates with limited mathematical knowledge struggled to solve the problems. This question proved that it is important that learners need to be able to apply their Mathematics knowledge in Physical Sciences.

(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

Teachers need to have good content knowledge of the photo-electric effect to help the learners understand this section.