GRADE 10

# Physical Sciences

## Teacher Toolkit: CAPS Planner and Tracker

2019 TERM 3

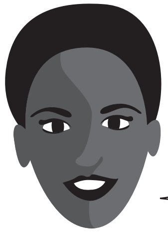
# CONTENTS

# A. ABOUT THE PLANNER AND TRACKER

## 1. Your quick guide to using this planner and tracker

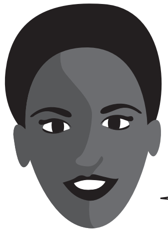
*What is the NECT and where do I fit in?*

What you do matters! What you do every day as a teacher can change the life-chances of every child that you teach. The NECT supports teachers by providing CAPS planners and trackers so that teachers can plan to cover the curriculum, track progress, and seek help when they are falling behind.



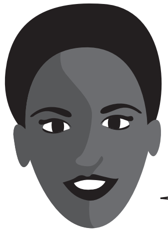
*But who will help me?*

The NECT will work with your school management team (SMT) and assist them to have supportive and professional conversations with you about curriculum coverage that will be orientated to identifying and solving problems.



*I have looked at the planner and tracker. It goes too fast!*

The CAPS planner and tracker is an expanded ATP. It helps you pace yourself as if you were able to cover everything in the ATP/CAPS. When you fall behind because time has been lost, or because the learners are progressing slowly, you need to confidently discuss this with your teaching team without feeling blamed. The pace of coverage will be determined by the pace of learning. That is why coverage must be tracked by the teacher and the SMT.



*How do I use the planner and tracker?*

See the "**Quick 5-step Guide to Using the CAPS Planners and Trackers**" on the opposite page.

## QUICK 5-STEP GUIDE TO USING THE CAPS PLANNERS AND TRACKERS

1. Find the textbook that YOU are using.

2. Use the planning page each week to plan your teaching for the week. It will help you link the CAPS content and skills to relevant material in the textbook, the teacher's guide, and other materials such as the DBE workbook.

3. Keep a record of the date when you were able to complete the topic. It may be different from the date you planned, and for different classes. Write this date in the column on the right for your records.

4. At the end of the week, reflect and check if you are up to date. Make notes in the blank space.

5. Be ready to have a professional and supportive curriculum coverage conversation with your HoD (or subject or phase head).

The CAPS planners and trackers also provide guidelines for assessment with samples, and may also have enrichment and remedial suggestions. Read the introduction pages carefully for a full explanation.

## 2. Purpose of the tracker

The Curriculum and Assessment Planner and Tracker is a tool to support you in your role as a professional teacher. Its main purpose is to help you keep pace with the time requirements and the content coverage of the CAPS by providing the details of what should be taught each day of the term; and of when formal assessments should be done. Each of the sessions for Physical Sciences in Grade 10 is linked to the approved sets of Learner's Books and Teacher's Guides on the National Catalogue, as well as the ***Everything Science*** textbook (Siyavula) which has been distributed to schools by the Department of Basic Education as an additional resource. You can download it from www.everythingscience.co.za.

The tracker provides a programme of work that should be covered each day of the term and a space for reflection of work done for each of the LTSMs on the National Catalogue. By following the programme in the tracker for the Learner's Book you are using, you will cover the curriculum in the allocated time, and complete the formal assessment programme. By noting the date when each session is completed, you can assess whether or not you are on track. If you are not, strategise with your head of department (HOD) and colleagues to determine the best way in which to make up time to ensure that all the content prescribed for the term is completed. In addition, the tracker encourages you to reflect on what parts of your lessons were effective, and which parts of your lessons can be strengthened. These reflections can be shared with colleagues. In this way, the tracker encourages continuous improvement in practice.

This tracker should be kept and filed at the end of the term.

## 3. Links to the CAPS

The Grade 10 Physical Sciences tracker is based on the requirements prescribed by the Department of Basic Education's Curriculum and Assessment Policy Statement (CAPS) for Physical Sciences in the Further Education and Training (FET) band. The CAPS prescribes four hours per week for Physical Sciences. The work set out in the tracker for each day is linked directly to the topics and subtopics given in the CAPS, with the specified amount of time is allocated to each topic. It gives the page number in the CAPS document of the topics and subtopics being addressed in each session. This enables you to refer to the curriculum document directly should you wish to do so.

## 4. Links to approved LTSMs

There is a tracker for each set of Learner's Books and Teacher's Guides of the approved books on the National Catalogue. The tracker aligns the CAPS requirements with the content set out in the approved Learner's Books and Teacher's Guides. You must refer to the tracker for the book that is used by learners at your school. If you have copies of other Learner's Books, you can also refer to these trackers to give you ideas for teaching the same content in a different way. However, ensure that you cover the content systematically. For each set of LTSMs in the tracker, links are given to the relevant pages in both the Learner's Book and Teacher's Guide to make it easier for teachers to access the correct resources. Links to the ***Everything Science*** materials have been inserted in the trackers for all Learner's Books.

In addition, further suggestions for extension, enrichment, and/or homework exercises have been made. We recommend that you always have an extra activity available for those learners who complete their work earlier than others.

Each tracker is based on the latest print editions of the three approved LTSMs. Take note that page numbers may differ slightly from other print runs of the same Learner's Book. If the page numbers in your edition are not exactly the same as those given in the tracker, you should use the activity/exercise numbers given in the tracker to guide you to the correct pages. These should only differ by a page or two from those given in the tracker.

## 5. Managing time allocated in the tracker

The tracker provides a suggested plan for 40 sessions, organised into four 60-minute sessions per week. Depending on your school's timetable, you may use two of these sessions in one double period. You might also need to adjust the work prescribed for a session to meet other demands of your timetable. However, the content that needs to be covered in a week, should always be covered in a week. If for some reason you do not complete the work set for the week, you need to find a way to get back on track.

The breakdown of work to be done each week corresponds to the annual teaching plan and programme of assessment drawn up by the Department of Education; however, the tracker gives a more detailed outline of what should be taught each day.

The tracker has been planned for a third term of 11 weeks. Ten weeks are allocated for covering the set curriculum, with Week 11 for revision and assessment. If the year in which you are using it has a longer or shorter third term, you will need to adjust the pace of work. It is important that you take note of this at the start of the year.

Homework has been allocated for most sessions. For learners to benefit from these activities, it is necessary to provide feedback on the homework. Do this at the beginning of the next lesson or at the end of a topic. Learners who do not complete their written work in time can complete the activity for homework. If some learners complete their work well ahead of schedule, consider providing them with enrichment activities. We have provided some examples of enrichment activities in this tracker. If some learners do not complete their written work in time, they can complete the enrichment activity for homework. If for any reason you miss a lesson, or find that you need to spend more time than planned on some aspect of the work, find a way to get back on track so that the curriculum for the term is covered as required.

## 6. Links to assessment

The tracker indicates where in the series of lessons the CAPS assessment activities/tasks/practical activities should be done. This varies slightly from Learner's Book to Learner's Book, but is always in line with the CAPS specifications. We suggest that you discuss testing times with your colleagues who teach other subjects. In this way you can avoid having learners write several tests on the same day in a single week.

For informal assessment tasks, you may want to use a variety of assessment methods, including peer assessment, self-assessment and spot marking.

## 7. Resource list

The tracker suggests resources that you could use for certain lessons. In addition, suggestions for alternative equipment and resources have been made. Learners need to **interact** with learning material as much as possible, therefore every attempt has been made to allow for such interaction.

## 8. Columns in the tracker

The following columns can be found in the tracker for each set of LTSMs:

1. Session number
2. Relevant CAPS page number
3. CAPS content, concepts and skills for the day
4. Learner's Book page number
5. Learner activity number
6. Teacher's Guide page number
7. ***Everything Science*** Learner's Book page number
8. ***Everything Science*** Teacher's Guide page number
9. Date completed – this needs to be filled in each day and there are columns for each of the classes you teach.

## 9. Weekly reflection

The tracker provides a space to record reflections on a weekly basis. This weekly reflection provides you with a record for the next time you implement the same lesson, and also forms the basis for collegial conversations with your head of department (HOD) and colleagues. It should be shared both informally and at regular departmental meetings. Together with your HOD and colleagues, think of ways of improving your lessons and in turn your learners' work. If for some reason not all the work for the week has been covered, strategise with your HOD and colleagues as to how best to catch up so that the curriculum is covered.

You are encouraged to reflect on your lessons daily – thinking about what went well, or did not go so well in each, and how better to help learners grasp the content being taught. Briefly jot down your reflection by following the prompts in the tracker. When reflecting, you could think about things such as:

- Was my preparation for the lesson adequate? For example: Did I have all the necessary resources? Had I thought through the content so that I understood it fully and could teach it effectively?
- Did the purpose of the lesson succeed? For example: Did the learners reach a good understanding of the key concepts for the day? Could the learners use the language expected from them? Could the learners write what was expected from them?
- Did the learners cope with the work set for the day? For example: Did they finish the classwork? Was their classwork done to an adequate standard? Did I assign any homework?
- What can I do to support learners who did not manage the work, or to extend those who completed the work easily?
- What might I change next time I teach this same content? Will I try a different approach?

# B. TERM PLANNING

Before considering weekly and daily plans which are set out in the tracker, think about the term as a whole.

## 1. Check the term focus

Take note of the focus for the term. The CAPS document provides clear details regarding the focus for Grade 10:

**Term 3 – *Chemistry:***
Reactions in aqueous solution
Quantitative aspects of chemical change
Basic stoichiometric calculations
***Physics:***
Vectors and scalars
Motion in one dimension
Instantaneous speed and velocity
Equations of motion

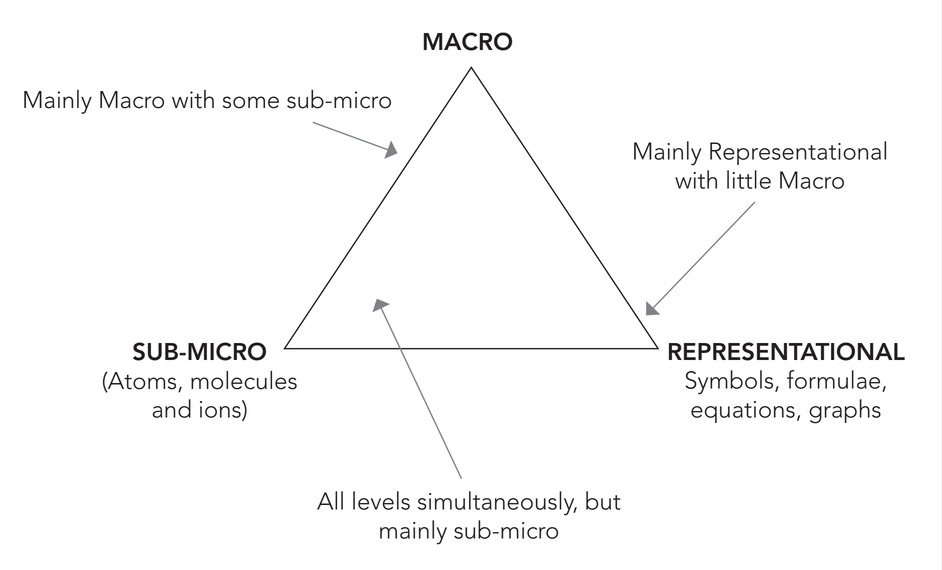
### *Overview of Term 3 Topics*

### Chemistry

The Chemistry topics for Term 3 provide the foundation for chemistry in Grades 11 and 12 and for learners who will go on to study chemistry at tertiary level. The content builds on to concepts studied in Grade 9. Research shows that many learners struggle with more advanced chemistry because they do not have a clear understanding of the basics concepts. For this reason, we encourage a revision session before each section is handled. It is also helpful to administer a few diagnostic tests where time permits. In this way, you can become aware of learners' misunderstandings and remediate these.

One way of helping learners to make sense of the large number of concepts in chemistry is to use a model called Johnstone's Triangle. Johnstone[1] observed that in many introductory chemistry lessons, learners are confronted with three different conceptual levels: they are introduced to materials and substances (macro level), a description of them in molecular or atomic terms (sub-micro level) and a representation of them by symbols and formulae (representational level) – all at the same time. Learners find it difficult to distinguish between these levels, which creates many misconceptions and a poor understanding of critical concepts.

### FIGURE 1: JOHNSTONE'S TRIANGLE



To use sulfur as an example: in the introduction of materials and substances at the macro level, they might hear about or see yellow sulfur powder or flowers of sulfur; at the sub-micro level there will be a description of the material or substance in molecular terms or atomic terms – that sulfur is an element with sixteen protons, neutrons and electrons; and then there will be a representation of the material or substance by symbols and formulae, for example S and S8. We suggest that you make it very clear to learners which area or viewpoint you are talking about, helping them to understand the links between the macro, sub-micro and representational levels. When dealing with the various ways of representing chemical substances – formulae, electronic configurations, ball-and-stick models and so on – say something such as 'Sulfur does not really look like this. We are making a drawing or a model to help us understand more about it.'

It is also important that learners do not try to learn chemistry by rote. Although some important information has to be learnt, e.g. the symbols of the elements found in the

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[1] Johnstone A.H., (1982), Macro and microchemistry, School Science Review, 64, 377–379.

Periodic Table, it is essential that learners build up a clear picture of what matter is and how the different terms used to describe matter – such as atom, element, molecule and compound – relate to each other. Since many of these concepts are not concrete because they are found at the sub-micro level, it is essential that you encourage learners to draw diagrams or build models to help them visualise abstract ideas. You should also encourage learners to verbalise and write down their ideas about this topic.

It is essential to revise the symbols used in chemistry that were introduced in earlier grades. Writing down the correct chemical formula of compounds is a skill that needs to be revised, discussed and practised often. Learners also need to become very familiar with extracting information from the Periodic Table.

During a chemical change, reactants disappear, products are formed and energy is exchanged with the surroundings. The atoms or ions of the reactants separate and are rearranged to form products. The separation of the atoms or ions involves breaking chemical bonds; this is a process for which energy is taken from the surroundings. The recombination of atoms during the formation of new chemical bonds releases energy to the surroundings.

Learners need to recognise that two conditions must be satisfied before particles can interact in a chemical change:

- The interacting particles must collide
- They must collide with enough energy to break the bonds within the particles.

**Physics**

The Physics topics for Term 3 also lay the foundation for more complex concepts in later years. Learners also get many opportunities to solve physics problems quantitatively. However, it is essential that you ensure that learners can understand and discuss physical phenomena as well as use formulae.

Physics is an intellectually demanding discipline and many students have difficulties learning to deal with it. Our instruction is often far less effective than we realise: recent investigations have revealed that many students, even when getting good marks, emerge from their basic physics courses with significant scientific misconceptions, prescientific notions, poor problem-solving skills, and with an inability to apply what they learned. Students' acquired physics knowledge is often nominal rather than functional.

Many people believe that physics is abstract and boring. There is a general view that while physics is intellectually challenging and worthwhile as a mental exercise, it has little relevance to our everyday lives. We need to change these notions of physics, and bring our learners to an understanding that much of what we do every day functions according to the laws of physics (walking is a trivial yet important example). Indeed, changing attitudes is very similar to changing erroneous conceptual ideas. Changing ideas and attitudes requires a radical change in outdated teaching methods.

Teachers know that there is a need to move away from the teacher-dominated lecture method of teaching. We also know that many positive steps have been made in this direction (although there are times when teacher talk is necessary). One way of breaking the tedium of the lecture is to intersperse it with short, relevant demonstrations or short learner activities.

Solving physics problems mathematically is a skill that must be learned and which requires practice. You should ensure that learners become able to solve problems with understanding and are not just copying solutions from each other or your solutions on the chalkboard or whiteboard. Think of Vygotsky's notion of the zone of proximal development and provide learners with problems incrementally.

Learners do not always make the connections that we think are obvious. They move from learning area to learning area in a day and Physical Science lessons may be 24 hours or more apart. There is no guarantee that on entering a physics class, they are thinking about physics! They need to be brought back to a previous discussion. When they are engaged in practical work, impress upon them that the activity is related to this or that concept. For example, they can be reminded that working with strings or springs is related to waves and that music is related to frequency, amplitude and wavelength.

(Some of the comments above are adapted from Frederic Reif's Millikan Lecture 1994.)

## 2. Prepare resources

This stage in your preparation is vital. The prescribed Learner's Books provide both information and activities. The Teacher's Guides also provide valuable information as teaching guidelines. When you are planning, you need to be familiar with the information in the textbook your learners will be using. This will ensure that you do not need to either read from the textbook or ask your learners to copy down notes from the chalkboard or projector.

Teaching Physical Sciences should not be based on reading and discussing the textbook. Learners need activities, demonstrations, problem solving opportunities and active debates. This all takes careful planning and preparation of resources.

Resources can range from everyday objects like a marble or a ball, to more scientific apparatus, such as a ticker timer, or even digital resources, for example, a short video clip or simulation. Whatever resource you select as the focus of the lesson, make sure you think carefully about the questions you will ask learners to think about and discuss. You may plan these discussions in pairs or small groups. Through observation, reflection and discussion you will engage learners in helping them construct their own knowledge. It is important to challenge this knowledge and at times disagree with them even if they are correct. You can also present a common misconception and encourage them to be critical of the proposed idea.

Problem solving and application of knowledge are very important in Physical Sciences. Your learners will need to practise exam-type questions; the textbooks all give worked examples. There are also end-of-chapter or unit questions, exam practice and additional worksheets. These have been referenced in the tracker for each book and are included as homework activities. However, in some cases the Learner's Book may not have enough questions and we have referred you to additional activities from the ***Everything Science*** textbook. If your learners don't have a copy, they can access these questions online from www.everythingscience.co.za. The Learner's Books can also be downloaded or print copies can be ordered from a supplier referred to on the same site. There is a huge database of questions that will be very useful for learners to work through both for remediation, revision and extension. Not all the activities are referenced in the tracker. If you identify that your learners are struggling in a particular section, select questions that are relevant to them.

A list of resources for the term appears below in case you want to collect these well in advance. Otherwise resources are listed per week. You will find it worthwhile to collect these well in advance and leave them in a box or something similar. This way, you will avoid a last-minute rush. Remember that some materials are used on several different occasions, so keep laboratory equipment safe and well cleaned. Depending on how quickly your learners complete a section, and on what activities you choose, you may find that you are still on a certain week when the following week's requirements are listed. Continue normally and check with the CAPS document to find out what you still need.

**Week 1:** Glass beakers; teaspoons; sodium chloride; potassium permanganate; sodium hydroxide; articles about acid rain; photographs of acid rain-affected buildings and statues; potassium nitrate; tap water; Periodic Table; 500 mg of each sugar, sodium chloride, calcium chloride and ammonium chloride; thermometer

**Week 2:** Glass beakers; teaspoons; soluble salts to form precipitations; acids and bases; sodium carbonate solution; hydrochloric acid solution, sodium hydroxide solution; silver nitrate solution; sodium bromide solution; sodium metal; manganese dioxide; burner; copper(II) sulfate; thin copper wire; nitric acid solution; potassium iodide solution; lead nitrate solution; examples of chemical reaction equations

**Week 3:** Glass beakers; teaspoons; copper(II) sulfate or cobalt(II) chloride; examples of moles of various elements, such as sulphur, iron, copper, aluminium and zinc

**Week 4:** Many examples of chemical equations; glass beaker; spatula; propette; water; bowl; filter paper; mass meter; sodium hydrogen carbonate; dilute sulfuric acid; burner; heating stand; boiling stones; water; magnesium powder; vinegar

**Week 5:** Squared paper or graph paper

**Week 6:** Long track; toy car; meter rule; cardboard; scissors; Prestik; tape; ticker timer and tape; power supply; trolley; inclined plane; retort stand; ruler

**Week 7:** Ticker timer and tape; power supply; trolley; inclined plane; retort stand; ruler

**Week 8:** Ticker timer and tape; power supply; trolley; inclined plane; retort stand; ruler; graph paper

**Week 9:** Graphs and equations of motion; problems

**Week 10:** Graphs and equations of motion; problems

## 3. Plan for required assessment tasks

Most of the Learner's Books and/or Teacher's Guides provide examples of CAPS-compliant formal assessment tasks, including practical investigations, revision activities and a sample control test.

Where the LTSMs used at your school have the test in the Learner's Book, this test cannot be used because the learners will be able to prepare for it in advance, but it is useful for revision and informal assessment. An exemplar test is provided in Section F *Assessment Resources* of this tracker.

Table 1 gives an overview of the formal practical assessment and test in each of the LTSMs, and where they are scheduled in the tracker for that LTSM. This will help you in your preparation.

**TABLE 1: FORMAL ASSESSMENT TASKS INCLUDED IN EACH SET OF APPROVED LTSMs FOR TERM 3**

| Name of book | Formal practical assessment | Control test<br>• Use for revision only, not for formal assessment |
|---|---|---|
| *Study and Master Physical Sciences* | **Week 9:** Prescribed experiment on acceleration; LB pp. 285–286, Act. 3–4; TG D82–83 | **Weeks 11:** Assessment task; LB pp. 292–294; TG D87–D89*<br>OR<br>Exemplar test provided in Section F<br>OR<br>Set your own test |
| *Platinum Physical Sciences* | **Week 9:** Prescribed experiment on acceleration; LB pp. 56–57, Exp. 2A–2B; TG pp. 129–131 | **Weeks 11:** Exam practice questions; LB p. 198; TG pp.106 –108*<br>OR<br>Exemplar test provided in Section F<br>OR<br>Set your own test |
| *Successful Physical Sciences* | **Week 8:** Prescribed experiment on acceleration; LB pp. 233–234, Exp. 2; TG pp. 143–144 | **Weeks 11:** Practice control test; LB pp. 276–277; TG pp. 184–186*<br>OR<br>Exemplar test provided in Section F<br>OR<br>Set your own test |

**Please note:** The DBE occasionally makes changes to the assessment requirements published in the CAPS. If any changes are made after this document is printed, you will need to adjust the assessment programme provided here and in the trackers accordingly.

# C . DAILY LESSON PLANNING AND PREPARATION

The tracker provides details of the content (in hour sessions) that you need to teach to your class. However, to deliver the lessons successfully, you must do the necessary preparation yourself. This entails a number of key steps that range from ensuring that you have a good understanding of the term focus through to checking the detailed preparation of resources needed for each lesson. Physical Sciences require a range of resource, from printed material to typical science apparatus, such as test tubes, or household items including food items.

## 1. Check your own knowledge of the content

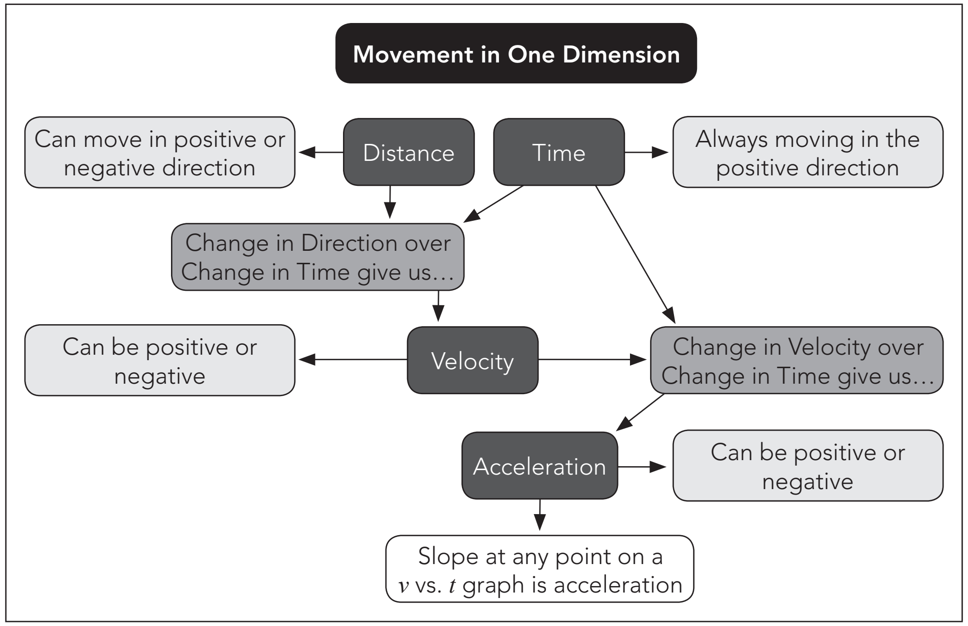
However well you know your work, it is easy to make small mistakes when in a classroom with learners asking questions. Always read through the content that you are going to cover to ensure that you are very familiar with the work. If possible, also do additional reading from other sources. Refer to Section E *Additional Information and Enrichment Activities* of this document where additional information about many of the topics for the term and some common errors – not always made explicit in the Learner's Books or Teacher's Guides – are addressed.

## 2. Prepare the conceptual framework for the lesson topic

When preparing the content to be taught think carefully about how the concepts are organised in a conceptual framework; how to help learners develop this framework for themselves; what possible questions learners might ask; and difficulties learners might have and how to address these.

One way of preparing the content is to summarise it using a tool such as a mind map, as shown in Figure 2. When you introduce a topic, learners will benefit from seeing the big picture and a concept map is a useful way to present this. It is also a useful way of showing learners how the class is progressing. At the end of the topic encourage your learners to make their own summaries in words and/or pictures. In this way, they will interact with concepts, and this in turn will promote deep learning.

**FIGURE 2: MIND MAP OF KEY CONCEPTS ASSOCIATED KEY CONCEPTS ASSOCIATED WITH MOTION IN ONE DIMENSION**



While you prepare the conceptual framework, it is important to think about what prior knowledge learners should have and to have a clear idea of where and when they will need to draw on the concepts taught in the Grade 9 lessons. In your preparation, think carefully about the types of questions learners will ask. You may want to pre-empt some of these questions by asking open-ended questions to arouse learners' curiosity and to engage them in the process of learning. It is also a good idea to leave a question unanswered for a short time and let the lesson activities suggest a possible answer. If the question is still unanswered, then you should provide the necessary help. Doing this will provide good opportunities for you to correct any wrong ideas or misconceptions.

## 3. Baseline assessment and remediation of misconceptions

Baseline assessment should take place at the beginning of each new topic. This enables you to establish what learners already know and to pick up any possible misconceptions. Some of the most common misconceptions have been addressed in relation to the relevant CAPS content in Section E *Additional Information and Enrichment Activities* of this document. Baseline assessment can take many forms – such as a quick question and answer session; or a paper and pencil activity. Once a gap in understanding or a misconception has been identified (e.g. some people think that when you kick a ball, it continues to move forward because of the force of the kick), address these misconceptions before moving on to teaching the new work for the term. In this context the word remediation refers to overcoming the learners' wrong ideas.

## 4. Learner activities

Think about the tasks that learners need to complete in each lesson because it is important that they do something constructive. On rare occasions they may copy something from the chalkboard or another medium, but this should not be the sole focus of the lesson. Some examples of activities they can do in each lesson include, answering questions by writing the answers (the CAPS encourages writing); completing translation activities by converting a drawing to a description, or a table to a graph. You set the stage for the learner activities by giving explanations about different concepts, asking questions, setting problem-solving activities, or giving clear instructions about what learners need to do.

In Section E *Additional Information and Enrichment Activities* of this document you will find ideas for activities linked to several CAPS topics beyond the scope of those given in many of the LTSMs. Refer to this resource when preparing your lessons. In some instances, a more appropriate practical activity than the one in the Learner's Book has been included for your use.

Ensure that you have enough chalk or markers. Where instructions in the Learner's Book that you are using is not clear, use the chalkboard (or whatever media you use in your classroom) to draw or write instructions about what the learners need to do in order to complete the prescribed activity. Chalkboards are also useful for the writing down and explaining of new vocabulary.

Always allow time in your lessons to review learners' work and to give formative feedback on any assessment that has been done. Ensure that during peer or self-assessment you have a list of possible answers.

## 5. Informal assessment

In addition to specifying the number and nature of the formal assessment tasks, the CAPS suggests that there should also be ongoing informal assessment each term. Learners can do a variety of informal assessment tasks, both in class and for homework, and many of the Learner's Book activities are useful for this purpose. Informal assessment tasks do not have to be marked by the teacher. You can allow learners to mark their own or each other's work. You should consider taking in about five or six pieces of work from time to time to help you assess progress informally and to keep learners attentive. Also change your review techniques from time to time.

While learners do not always need marks for their work, they do need feedback. You need to know which concepts they understood and which one they did not. This will enable you to correct and support their learning. Record any marks that are awarded or key comments for your own interest.

## 6. Learners with special needs

People are not all the same. Learners will attend the Physical Science classes with different needs, styles of learning and also with a variety of alternative ideas about scientific phenomena. It is challenging for a teacher to accommodate all these differences, but it is important that you consider these differences during your preparation.

For different learning styles, the teacher can use a variety of teaching methods. These include whole class teaching, peer interaction, small-group learning, writing activities, drawing and mind-mapping activities, presentations, debates and role play. Wherever possible, encourage reading, writing and speaking skills.

There is a large amount of additional information to help you in the Teacher's Guides. The Learner's Books also provide additional suggestions. Additional to this, the DBE has published some excellent materials to support you in working with learners with learning barriers. Two such publications are:

- Directorate Inclusive Education, Department of Basic Education (2011) *Guidelines for responding to learner diversity in the classroom through curriculum and assessment policy statements*. Pretoria. www.education.gov.za, www.thutong.doe.gov.za/InclusiveEducation
- Directorate Inclusive Education, Department of Basic Education (2010) *Guidelines for inclusive teaching and learning. Education White Paper 6. Special needs education: Building an inclusive education and training system.* Pretoria. www.education.gov.za, www.thutong.doe.gov.za/InclusiveEducation

## 7. Enrichment

In certain tasks, learners will work at different speeds. For those learners who complete their work earlier than others, refer to enrichment or extension activities in the Teacher's Guide, those suggested in Section E *Additional Information and Enrichment Activities* or provided in Section G *Additional Worksheets* of this document.

## 8. Homework

It is essential for Grade 10 learners to do homework every day. Examine the tracker and decide what sorts of tasks are appropriate for homework each week. Allow a few minutes at the end of each lesson to provide homework instructions. Homework can be a useful consolidation exercise and need not take learners very long. If well planned in advance, learners can sometimes be given a longer homework exercise to be handed in within a week. This arrangement allows for flexibility.

If homework tasks are allocated, it is essential to allow a few minutes at the start of the following lesson to review the previous day's homework.

## 9. Practical work

Practical work must be integrated with theory to strengthen the concepts being taught. This may take the form of simple practical demonstrations or an experiment or practical investigation. Some of these practical activities will be done as part of formal assessment and others can be done as part of informal assessment. Learners are also required to complete one project on either Physics or Chemistry. This gives a total of three formal assessments in practical work in Physical Sciences. It is also recommended that learners do a minimum of four experiments for informal assessment (two Chemistry and two Physics experiments). This gives a total of seven assessments in practical work in Physical Sciences for the year. Learners need to understand and experience that practical work in science distinguishes this discipline from other knowledge areas.

In Term 3, learners are required to investigate acceleration as the formal assessment for Physics. In order to prepare learners for this formal assessment it is important to give them opportunities to complete other Physics investigations.

For learners to achieve the most from their experience of practical work, you need to be extremely well prepared. Think carefully and plan how to accommodate all learners in doing practical activities. In most schools, there may be a limited amount of equipment. This means that you may need to give groups of learners the opportunity to complete the practical work after school hours. If equipment is limited, one solution is to set up different stations with different equipment. Learners rotate from one station to the next in order to complete a series of experiments.

Learners also need to be well prepared for any formal or informal practical work. In the trackers, you will see that learners are required to review the investigations for homework one the day before they are required to do the investigation. You could ask them to complete pre-practical questions.

Safety is critical whenever doing practical work. Please ensure you discuss safety rules with your learners regularly. Refer to the websites below that deal with laboratory safety:

- International chemical safety cards: www.inchem.org/pages/icsc.html
- Merck safety data sheets: www.merck-chemicals.com/msds-search/
- School chemistry laboratory safety guide: www.cdc.gov/niosh/docs/2007-107/pdfs/2007-107.pdf
- WCED laboratory safety guidelines: www.curriculum.wcape.school.za/site/52/pol/view/

To conduct a successful practical activity, the following procedures are suggested:

- Before the practical session, check that the materials are the correct ones so that no mistakes occur.
- Talk through the activity with learners or get them to read the descriptions from the Learner's Book before they come to a practical class.
- Stop from time to time to emphasise certain points. For example, **remember to use safety glasses and not to look directly at burning magnesium**.
- Let learners sometimes work in their chosen groups of friends and change the groups on other occasions.
- Keep a watchful eye on the activity and walk around looking at what learners are doing. This teaching strategy provides you with the opportunity to assess their skills of working with apparatus.
- Drawing the experimental set-up on the chalkboard or another medium helps learners to focus.
- Ensure that books and bags are safely stowed away from the practical work area.
- Enforce a strict rule of **no tasting**. There should be no eating of any kind in the laboratory or classroom where investigations are conducted.
- Ensure that work areas are clean both before and after the practical activity.
- Encourage learners to wear plastic aprons and safety glasses and insist on closed shoes wherever possible.
- Insist on the correct labelling of all tubes and bottles.
- Set a good example by following correct procedures at all times.
- Insist that learners tidy their workplaces when they have finished.
- Have a supply of tap water at hand in case of accidental acid spills. Do not attempt to neutralise acids and bases on a learner or yourself. Simply wash with plenty of water.
- Have a fire extinguisher handy and know how to use it.
- Keep a supply of gauze and plasters in a simple first aid box. A plastic container works well.

## D. TRACKERS FOR EACH SET OF APPROVED LTSMs

This section maps out how you should use your Physical Sciences Learner's Book and Teacher's Guide in a way that enables you to cover the curriculum sequentially and in a well-paced manner, aligning with the CAPS for meaningful teaching.

The following components are provided in the columns of the tracker:

1. Lesson number
2. CAPS concepts, practical activities, assessment tasks and page reference number
3. Learner's Book page number
4. Learner's Book activity/task
5. Teacher's Guide page number
6. ***Everything Science*** Learner's Book page number
7. ***Everything Science*** Teacher's Guide page number
8. Completion date

In addition, a list of resources for each session and enrichment ideas are provided.

### *Weekly reflection*

The tracker provides space for you to jot down both successes and ideas for a different approach in future years. This reflection should be based on the daily sessions you have taught during the week.

Share your ideas with colleagues and with your HOD. Discuss aspects that went well and aspects that did not go as well as you expected.

- Did the learners grasp the main concepts of the lesson?
- Was my content preparation adequate?
- Did I have all the correct resources in sufficient numbers?
- Did the learners interact with the learning material provided?
- Did learners ask and answer questions relating to the concept?
- Did the learners finish their work in time?
- Was there enough work to keep learners busy for the allocated time?
- What quality of homework did learners produce?

Put your thoughts in writing by briefly jotting down your reflections each week but **think** about your lessons daily.

The prompts for reflection in the tracker are as follows:

- *What went well?*
- *What did not go well?*
- *What did the learners find difficult or easy to understand or do?*
- *What will you do to support or extend learners?*
- *What will you change next time? Why?*
- *Did you complete all the work set for the week?*
- *If not, how will you get back on track?*

The reflection should be based on the daily lessons you have taught each week. It will provide you with a record for the next time you implement the same lesson, and also forms the basis for collegial conversations with your HOD and peers.

## Explanation of abbreviations and symbols used in the trackers

| | |
|---|---|
| A | Answer |
| Act. | Activity |
| CA | Class activity |
| Demo. | Demonstration |
| ES | *Everything Science* |
| Ex. | Exercise |
| Exp. | Experiment |
| HOD | Head of Department |
| IA | Informal assessment |
| Inv. | Investigation |
| LB | Learner's Book |
| No. | Number |
| p. | Page |
| PA | Practical activity |
| PD | Practical demonstration |
| PT | Periodic table |
| pp. | Pages |
| Q. | Question |
| S # | Hour session |
| TG | Teacher's Guide |
| WS | Worksheet |
| # | Examined in Grade 12 |
| TYS | Test Yourself (*Study and Master*) |

## 1. *Study and Master Physical Sciences* (Cambridge University Press)

| *Study and Master Physical Sciences* **Week 1: Reactions in aqueous solution** | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **S #** | **CAPS concepts, practical activities and assessment tasks** | **CAPS pp.** | **LB pp.** | **LB Act.** | **TG pp.** | ***Everything Science*** | | **Class** | | | | |
| | | | | | | **LB pp.** | **TG pp.** | **Date completed** | | | | |
| **Ions in aqueous solution: their interaction and effects** | | 46–48 | | | | | | | | | | |
| 1 | • **Explain** how water is able to dissolve ions<br>• **Represent** the dissolution process using balanced equations using the abbreviations (s) and (aq), e.g. $NaCl(s) \rightarrow Na^+(aq) + Cl^-(aq)$<br>• **Define** the process of dissolving (solid ionic crystals breaking up into ions in water) | 46 | 214–216 | | D62 | 309–312<br>Ex. 18.1 | 50, 192 | | | | | |
| **Homework:** LB Act. 2 pp. 216–217 | | | | | | | | | | | | |
| 2 | **Practical work**<br>Investigate different types of solutions<br>Write balanced equations for each<br>Investigate different types of reactions in aqueous medium and write balanced ionic equations for the different reaction types<br>**Activity:** Explain what is meant by ion exchange reactions and use an experiment to illustrate the concept of ion exchange reactions | 46 | 216 | Act. 1 | D62–D64 | 310–312 | 50, 192 | | | | | |
| **Homework:** LB Act. 2 pp. 216–217; read LB pp. 217–218 | | | | | | | | | | | | |
| **Electrolytes and extent of ionisation as measured by conductivity** | | 47 | | | | | | | | | | |
| 3 | • Define the process of hydration where ions become surrounded with water molecules in water solution<br>• Describe a simple circuit to measure conductivity of solutions<br>• Relate conductivity to the **concentration of ions** in solution and this to the solubility of particular substances<br>**Experiment:** Determine the electrical conductivity and the physical or chemical changes of solutions | 47 | 217–219 | Act. 3<br>Act. 4 | D64–D65 | 312–315 | 50,<br>192–193 | | | | | |
| **Homework:** LB Act. 5 p. 219 | | | | | | | | | | | | |
| **Precipitation reactions** | | 48 | | | | | | | | | | |
| 4 | • Write balanced reaction equations to describe precipitation of insoluble salts | 48 | 219–220 | | D64–D65 | 315–316 | 50, 193 | | | | | |
| **Homework:** LB p. 220 Re-read solubility rules; ES p. 317 | | | | | | | | | | | | |

| Reflection | |
|---|---|
| **Think about and make a note of:** What went well? What did not go well? What did the learners find difficult or easy to understand or do? What will you do to support or extend learners? Did you cover all the work set for the week? If not, how will you get back on track? | What will you change next time? Why? |
| | **HOD:** **Date:** |

### *Study and Master Physical Sciences* Week 2: Reactions in aqueous solution

| S # | CAPS concepts, practical activities and assessment tasks | CAPS pp. | LB pp. | LB Act. | TG pp. | *Everything Science* | | Class | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | |
| | | | | | | LB pp. | TG pp. | Date completed | | | | |
| **Precipitation reactions** | | 48–49 | | | | | | | | | | |
| 1 | • Explain how to test for the presence of anions in solution<br>• Identify an ion or ions in a solution from a description of the reactants mixed and the observations of the products | 48 | 221–223 | Act. 6 | D65–D66 | 317–319 | 50, 193 | | | | | |
| **Homework:** LB p. 223 Complete writing ionic equations | | | | | | | | | | | | |
| 2 | • Identify an ion or ions in a solution from a description of the reactants mixed and the observations of the products | 48 | 223–224 | Act. 7 | D67 | 319–320 | 50, 193–194 | | | | | |
| **Homework:** LB p. 224 Method points 6 and 7; ES p. 320 Ex. 18.2 | | | | | | | | | | | | |
| **Other chemical reaction types in water solution** | | 49 | | | | | | | | | | |

<table>
<tr><th rowspan="2">S #</th><th rowspan="2">CAPS concepts, practical activities and assessment tasks</th><th rowspan="2">CAPS pp.</th><th rowspan="2">LB pp.</th><th rowspan="2">LB Act.</th><th rowspan="2">TG pp.</th><th colspan="2"><em>Everything Science</em></th><th colspan="5" rowspan="2">Date completed</th></tr>
<tr><th>LB pp.</th><th>TG pp.</th></tr>
<tr><td>3</td><td>• Ion exchange reactions<br>• Precipitation reactions<br>• Gas-forming reaction<br>• Acid-base reactions<br>• Redox reactions which are an electron transfer reaction<br>• Use the charge of the atom to demonstrate how losing or gaining electrons affects the overall charge of an atom</td><td>49</td><td>225–230</td><td>Act. 8</td><td>D67</td><td>320–322</td><td>50,<br>193–194</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="13"><strong>Homework</strong> LB p. 232–233 Case Study Act. 10</td></tr>
<tr><td>4</td><td><strong>Recommended experiment for informal assessment</strong><br>Identify <strong>chemical reaction types</strong> experimentally<br>Identify the driving force of each reaction type<br>Identify each reaction type in a group of miscellaneous chemical reactions</td><td>49</td><td>231</td><td>Act. 9</td><td>D68–D69</td><td>322–323</td><td>50,<br>195–197</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="13"><strong>Homework:</strong> ES p. 324–326 End-of-chapter exercises</td></tr>
<tr><th colspan="13">Reflection</th></tr>
<tr><td colspan="6"><strong>Think about and make a note of:</strong> What went well? What did not go well? What did the learners find difficult or easy to understand or do? What will you do to support or extend learners? Did you cover all the work set for the week? If not, how will you get back on track?</td><td colspan="7">What will you change next time? Why?<br><br><strong>HOD:</strong> <strong>Date:</strong></td></tr>
</table>

## *Study and Master Physical Sciences* Week 3: Quantitative aspects of chemical change

| S # | CAPS concepts, practical activities and assessment tasks | CAPS pp. | LB pp. | LB Act. | TG pp. | *Everything Science* | | Class | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | |
| | | | | | | LB pp. | TG pp. | Date completed | | | | |
| **Atomic mass and the mole concept** | | 50=51 | | | | | | | | | | |
| 1 | • Describe the mole as the SI unit for amount of substance<br>• Relate amount of substance to relative atomic mass | 50 | 234–237 | | D69–D70 | 327–329 | 50–51, 198–199 | | | | | |
| **Homework:** Review example LB p. 237; ES pp. 328–329 Ex. 19.1 | | | | | | | | | | | | |
| **Molecular and formula masses** | | 51 | | | | | | | | | | |
| 2 | • Reason qualitatively and proportionally the relationship between number of moles, mass and molar mass<br>• Calculate mass, molar mass and number of moles according to the relationship: $n = \frac{m}{M}$<br>• Determine the **empirical formula** for a given substance from percentage composition<br>• Determine the number of moles of **water of crystallisation** in salts | 51 | 237–239 | | D70 | 329–333 Ex. 19.2 | 50–51, 199–203 | | | | | |
| **Homework:** ES p. 331 Ex. 19.3 | | | | | | | | | | | | |
| 3 | • Determine the **empirical formula** for a given substance from percentage composition<br>• Determine the number of moles of **water of crystallisation** in salts<br>**Experiment:** Do an experiment to remove the water of crystallisation from copper(II) sulphate or cobalt(II) chloride and determine the number of moles of water removed from the crystals | 51 | 240–243 | Act. 1 | D70–D72 | 336–337 Act. 19.4 | 50–51, 203–205 | | | | | |
| **Homework:** LB p. 242–243 Act. 2 | | | | | | | | | | | | |
| **Determining the composition of substances** | | 51 | | | | | | | | | | |
| 4 | Determine **percent composition** of an element in a compound<br>Define and determine concentration as moles per volume | 51 | 243–244 | Act. 4<br>Exp. 1 | D72–D73 | 337–342 Ex. 19.5 | 50–51, 206–210 | | | | | |
| **Homework:** LB p. 245 Complete Q. a–g; LB p. 244 Act. 3 | | | | | | | | | | | | |

**Reflection**

| | |
|---|---|
| **Think about and make a note of:** What went well? What did not go well? What did the learners find difficult or easy to understand or do? What will you do to support or extend learners? Did you cover all the work set for the week? If not, how will you get back on track? | What will you change next time? Why? |
| | **HOD:** **Date:** |

## *Study and Master Physical Sciences* Week 4: The mole concept

| S # | CAPS concepts, practical activities and assessment tasks | CAPS pp. | LB pp. | LB Act. | TG pp. | *Everything Science* | | Class | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | LB pp. | TG pp. | Date completed | | | | |
| **Determining the composition of substances** | | 51 | | | | | | | | | | |
| 1 | • Determine **percent composition** of an element in a compound<br>• Define and determine concentration as moles per volume | 51 | 245–246 | Act. 4<br>Exp. 2 | D72–D73 | 346–348<br>Ex. 19.6 | 50–51,<br>210–213 | | | | | |
| **Homework:** LB p. 246 Complete questions | | | | | | | | | | | | |
| **Amount of substance (mole), molar volume of gases, concentration of solutions** | | 51 | | | | | | | | | | |
| 2 | • Calculate the number of moles of a salt with given mass<br>• Define volume<br>• Calculate the molar concentration of a solution | 51 | 246–250 | | D73 | 348–350 | 50–51 | | | | | |
| **Homework:** LB p. 250 Act. 5 | | | | | | | | | | | | |
| **Basic stoichiometric calculations** | | 52 | | | | | | | | | | |
| 3 | • Do calculations based on concentration, mass, moles, molar mass and volume<br>• Determine the theoretical yield of a product in a chemical reaction, when you start with a known mass of reactant | 52 | 250–253 | | D73–D74 | 350–353 | 50–51 | | | | | |
| **Homework:** LB p. 252 Act. 6 | | | | | | | | | | | | |
| 4 | • Do calculations based on concentration, mass, moles, molar mass and volume<br>• Determine the theoretical yield of a product in a chemical reaction, when you start with a known mass of reactant | 52 | 250–253 | | D74–D75 | 350–353<br>Ex. 19.7 | 50–51,<br>213–216 | | | | | |
| **Homework:** LB p. 254–255 Assessment Task Examples 1–3 | | | | | | | | | | | | |

| Reflection | |
|---|---|
| **Think about and make a note of:** What went well? What did not go well? What did the learners find difficult or easy to understand or do? What will you do to support or extend learners? Did you cover all the work set for the week? If not, how will you get back on track? | What will you change next time? Why? |
| | **HOD:** **Date:** |

## *Study and Master Physical Sciences*   Week 5: Vectors and scalars

| **S #** | **CAPS concepts, practical activities and assessment tasks** | **CAPS pp.** | **LB pp.** | **LB Act.** | **TG pp.** | ***Everything Science*** | | **Class** | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | |
| | | | | | | **LB pp.** | **TG pp.** | **Date completed** | | | | |
| **Solutions and chemical change** | | 46–52 | | | | | | | | | | |
| 1 | Complete and revise Chemistry | 46–52 | 255 | Examples 4, 5 | D74–D75 | 355–357 | 50–51, 216–227 | | | | | |
| **Homework:** LB p. 254–255 Assessment Task Examples 6–8 | | | | | | | | | | | | |
| **Vectors and scalars** | | 53 | | | | | | | | | | |
| 2 | **Introduction to vectors and scalars**<br>• List physical quantities, e.g. time, mass, weight<br>• Define a vector and a scalar quantity | 53 | 256–257 | | D76–D78 | 358–359 | 51, 228 | | | | | |
| **Homework:** LB p. 256 Read Key questions; LB p. 262 Example 1 | | | | | | | | | | | | |
| 3 | • Understand that → F represents the force factor, whereas F represents the magnitude of the force factor | 53 | 257–258 | | D78 | Ex. 20.1 | 51, 228 | | | | | |
| **Homework:** LB p. 258 Redraw diagrams at various angles; LB p. 263 Example 2 | | | | | | | | | | | | |
| 4 | **Graphical representation of vector quantities**<br>• Properties of vectors, such as equality of vectors, negative vectors, addition, subtraction of vectors using the force vector as example | 53 | 258–259 | | D78 | 364–365<br>Ex. 20.3 | 51, 230–234 | | | | | |
| **Homework:** LB p. 263 Example 2 | | | | | | | | | | | | |

| **Reflection** | |
|---|---|
| **Think about and make a note of:** What went well? What did not go well? What did the learners find difficult or easy to understand or do? What will you do to support or extend learners? Did you cover all the work set for the week? If not, how will you get back on track? | What will you change next time? Why? |
| | **HOD:** **Date:** |

## *Study and Master Physical Sciences* Week 6: Vectors and scalars and motion in one dimension

| S # | CAPS concepts, practical activities and assessment tasks | CAPS pp. | LB pp. | LB Act. | TG pp. | *Everything Science* | | Class | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | LB pp. | TG pp. | Date completed | | | | |
| **Vectors and scalars** | | | | | | | | | | | | |
| 1 | • Define resultant vector<br>• Find resultant vector graphically using the tail-to-head method, as well as by calculation for a maximum of four force vectors **in one dimension only** | 53 | 259–262 | | D78 | 366–371 | 51 | | | | | |
| **Homework:** LB p. 263 Example 3 | | | | | | | | | | | | |
| 2 | • Define resultant vector<br>• Find resultant vector graphically using the tail-to-head method, as well as by calculation for a maximum of four force vectors **in one dimension only** | 53 | 262–263 | Act. 1 | D78–D79 | 371–378 Ex. 20.4 | 51, 230–234 | | | | | |
| **Homework:** LB p. 263 Complete Act. 1; ES p. 378–379 Ex. 20.5 | | | | | | | | | | | | |
| **Motion in one dimension:** | | 54–55 | | | | | | | | | | |
| 3 | **Reference frame, position, displacement and distance**<br>• Describe the concept of a frame of reference | 54–55 | 264–265 | | D79 | 381–385 End-of-chapter exercises | 51–52, 239 | | | | | |
| **Homework:** ES p. 381–385 Complete End-of-chapter exercises | | | | | | | | | | | | |
| 4 | **Reference frame, position, displacement and distance** | 54–55 | 264–265 | | D79 | 385–386 Ex. 21.1 | 51–52, 240–242 | | | | | |
| **Homework:** ES pp. 385–386 Ex. 21.2 | | | | | | | | | | | | |

| Reflection | |
|---|---|
| **Think about and make a note of:** What went well? What did not go well? What did the learners find difficult or easy to understand or do? What will you do to support or extend learners? Did you cover all the work set for the week? If not, how will you get back on track? | What will you change next time? Why? |
| | **HOD:** **Date:** |

## *Study and Master Physical Sciences* Week 7: Motion in one dimension

| S # | CAPS concepts, practical activities and assessment tasks | CAPS pp. | LB pp. | LB Act. | TG pp. | *Everything Science* | | Class | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | |
| | | | | | | LB pp. | TG pp. | Date completed | | | | |
| **Motion in one dimension** | | | | | | | | | | | | |
| 1 | **Average speed, average velocity, acceleration**<br>• Define average speed which is a scalar quantity<br>• Define average velocity which is a vector quantity | 55 | 266–269 | | | 390–393 Ex. 21.3 (1) | 51–52, 242–243 | | | | | |
| **Homework:** ES pp. 390–393 Ex. 21.3 (2) | | | | | | | | | | | | |
| 2 | **Average speed, average velocity, acceleration**<br>• Use $\bar{v}$ as a symbol for average velocity<br>• Convert between different units of speed and velocity, e.g. m.s$^{-1}$, km.h$^{-1}$ | 55 | 270–271 | Start Act. 1 (Exp.) | D80 | 394 | 51–52, 242–243 | | | | | |
| 3 | **Average speed, average velocity, acceleration**<br>• Use $\bar{v}$ as a symbol for average velocity<br>• Convert between different units of speed and velocity, e.g. m.s$^{-1}$, km.h$^{-1}$ | 55 | 270–271 | Complete Act. 1 | D80 | 395 | 51–52, 242–243 | | | | | |
| **Homework:** LB p. 272 Q. a and b | | | | | | | | | | | | |
| 4 | **Average speed, average velocity, acceleration**<br>Define average acceleration as the change in velocity divided by time | 55 | 272–274 | | D80 | 396–398 Start Ex. 21.4 | 51–52, 245–246 | | | | | |
| **Homework:** ES 386–398 Complete Ex. 21.4 | | | | | | | | | | | | |

**Reflection**

**Think about and make a note of:** What went well? What did not go well? What did the learners find difficult or easy to understand or do? What will you do to support or extend learners? Did you cover all the work set for the week? If not, how will you get back on track?

What will you change next time? Why?

**HOD:**

**Date:**

## *Study and Master Physical Sciences* Week 8: The equations of motion

| S # | CAPS concepts, practical activities and assessment tasks | CAPS pp. | LB pp. | LB Act. | TG pp. | *Everything Science* | | Class | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | LB pp. | TG pp. | Date completed | | | | |
| 1 | **Average speed, average velocity, acceleration**<br>• Define average acceleration as the change in velocity divided by time | 55 | 275–276 | Start Act. 2 | D81–D82 | 396–398 | 51–52 | | | | | |
| **Homework:** Complete Act. 2 | | | | | | | | | | | | |
| **Instantaneous speed and velocity and the equations of motion** | | 56 | | | | | | | | | | |
| 2 | **Instantaneous velocity, instantaneous speed**<br>• Define instantaneous velocity as the displacement divided by an infinitesimal time interval<br>• Define instantaneous speed as the *magnitude* of the instantaneous velocity | 56 | 276–277 | | D81 | 399–401 | 51–52 | | | | | |
| **Homework:** Review ES pp. 399–401 on instantaneous speed and velocity | | | | | | | | | | | | |
| **The equations of motion** | | | | | | | | | | | | |
| 3 | • Describe the motion of an object given its position vs time graph<br>• Determine the velocity of an object from the gradient of the position vs time graph | 56–57 | 279–280 | Start Act. 1 | D81 | 401–405 | 51–52 | | | | | |
| **Homework:** ES pp. 403–405 Ex. 21.5 | | | | | | | | | | | | |
| 4 | • Describe the motion of an object given its position vs time graph<br>• Determine the velocity of an object from the gradient of the position vs time graph | 56–57 | 280–281 | Complete Act. 1 | D81 | 405–407 Exp. | 51–52 | | | | | |
| **Homework:** ES p. 407 Answer Q. 2–4 | | | | | | | | | | | | |

| Reflection | |
|---|---|
| **Think about and make a note of:** What went well? What did not go well? What did the learners find difficult or easy to understand or do? What will you do to support or extend learners? Did you cover all the work set for the week? If not, how will you get back on track? | What will you change next time? Why? |
| | **HOD:** **Date:** |

## *Study and Master Physical Sciences* Week 9: The equations of motion

| S # | CAPS concepts, practical activities and assessment tasks | CAPS pp. | LB pp. | LB Act. | TG pp. | *Everything Science* | | Class | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | LB pp. | TG pp. | Date completed | | | | |
| **1** | • Determine the acceleration of an object from the gradient of the velocity vs time graph | 56–57 | 282–283 | | D81 | 407–409 | 51–52 | | | | | |
| **Homework:** ES p. 409 Review summary of graphs | | | | | | | | | | | | |
| 2 | • Determine the acceleration of an object from the gradient of the velocity vs time graph<br>• Determine the displacement of an object by finding the area under a velocity vs time graph | 56–57 | 283–284 | Start Act. 2 | D81–D82 | 414 | 51–52 | | | | | |
| **Homework:** LB p. 283–284 Complete Act. 2 | | | | | | | | | | | | |
| 3 | • Describe the motion of an object given its position vs time graph<br>• Determine the displacement of an object by finding the area under a velocity vs time graph | 56–57 | 285 | Act. 3 | D82–D83 | 414–418 | 51–52,<br>249–250 | | | | | |
| **Homework:** LB p. 286 Answer Q. a and b; ES pp. 418–419 Ex. 21.6 | | | | | | | | | | | | |
| 4 | Recommended project for formal assessment | 56 | 286 | Act. 4 | D83–D84 | 410–411 | 51–52,<br>249–250 | | | | | |
| **Homework:** ES pp. 418–419 Ex. 21.6 | | | | | | | | | | | | |

**Reflection**

| | |
|---|---|
| **Think about and make a note of:** What went well? What did not go well? What did the learners find difficult or easy to understand or do? What will you do to support or extend learners? Did you cover all the work set for the week? If not, how will you get back on track? | What will you change next time? Why? |
| | **HOD:** **Date:** |

## *Study and Master Physical Sciences* Week 10: The equations of motion

| S # | CAPS concepts, practical activities and assessment tasks | CAPS pp. | LB pp. | LB Act. | TG pp. | *Everything Science* | | Class | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | LB pp. | TG pp. | Date completed | | | | |
| 1 | • Use the kinematics equations to solve problems involving motion in one dimension<br>• Demonstrate an understanding of motion of a vehicle and safety issues | 56–57 | 287–288 | | D 85 | 427–429 | 51–52,<br>249–250 | | | | | |
| **Homework:** Review ES p. 427 Example 9; ES p. 423–424 Ex. 21.7 (1–3) | | | | | | | | | | | | |
| 2 | • Use the kinematics equations to solve problems involving motion in one dimension | 56–57 | 228–290 | Act. 6 Case Study | D86 | 419–424 Ex. 21.7 (4–7) | 51–52,<br>253 | | | | | |
| **Homework:** LB p. 290–291 Act. 7; ES p. 431–432 (1–7) | | | | | | | | | | | | |
| 3 | • Use the kinematics equations to solve problems involving motion in one dimension<br>• Demonstrate an understanding of motion of a vehicle and safety issues | 56–57 | 292–293 | Q. 1–2 | B21–B22 | 433(7–10) | 51–52,<br>253–256 | | | | | |
| **Homework:** LB p. 292–293 Q. 3; ES p. 434 (11–12) | | | | | | | | | | | | |
| 4 | • Use the kinematics equations to solve problems involving motion in one dimension | 56–57 | 293–294 | Q. 4 | B21–B22 | 434 (13) | 51–52,<br>256–269 | | | | | |
| **Homework:** LB p. 294 Q. 5; ES p. 435 (14–15) | | | | | | | | | | | | |

**Reflection**

**Think about and make a note of:** What went well? What did not go well? What did the learners find difficult or easy to understand or do? What will you do to support or extend learners? Did you cover all the work set for the week? If not, how will you get back on track?

What will you change next time? Why?

**HOD:**

**Date:**

| *Study and Master Physical Sciences* **Week 11: Revision and assessment** | |
|---|---|
| **End-of-term reflection** | |
| **Think about and make a note of:**<br>1. Was the learners' performance during the term what you had expected and hoped for? Which learners need particular support with Physical Sciences in the next term? What strategy can you put in place for them to catch up with the class? Which learners would benefit from extension activities? What can you do to help them? | 3. What ONE change should you make to your teaching practice to help you teach more effectively next term? |
| 2. With which specific topics did the learners struggle the most? How can you adjust your teaching to improve their understanding of this section of the curriculum in the future? | 4. Did you cover all the content as prescribed by the CAPS for the term? If not, what are the implications for your work on these topics in future? What plan will you make to get back **on track**? |
| **HOD:** | **Date:** |

## 2. *Platinum Physical Sciences* (Maskew Miller Longman)

***Platinum Physical Sciences*** **Week 1: Reactions in aqueous solution**

| S # | CAPS concepts, practical activities and assessment tasks | CAPS pp. | LB pp. | LB Act. | TG pp. | *Everything Science* | | Class | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | LB pp. | TG pp. | Date completed | | | | |
| **Ions in aqueous solution: their interaction and effects** | | 46–48 | | | | | | | | | | |
| 1 | • **Explain** how water is able to dissolve ions<br>• **Represent** the dissolution process using balanced equations using the abbreviations (s) and (aq), e.g. $NaCl(s) \rightarrow Na^+(aq) + Cl^-(aq)$<br>• **Define** the process of dissolving (solid ionic crystals breaking up into ions in water) | 46 | 163–165 | Exp. 1 | 92–93 | 309–312<br>Ex. 18.1 | 50, 192 | | | | | |
| **Homework:** Read LB pp. 166–169 | | | | | | | | | | | | |
| 2 | **Practical work**<br>• Investigate different types of solutions<br>• Write balanced equations for each<br>• Investigate different types of reactions in aqueous medium and write balanced ionic equations for the different reaction types<br>**Activity:** Explain what is meant by ion exchange reactions and use an experiment to illustrate the concept of ion exchange reactions | 46 | 166–169 | Exp. 2<br>p. 166<br>Exp. 1<br>p. 169 | 94–95 | 310–312 | 50, 192 | | | | | |
| **Homework:** LB p. 168 Act. 1 and 2 | | | | | | | | | | | | |
| **Electrolytes and extent of ionisation as measured by conductivity** | | 47 | | | | | | | | | | |
| 3 | • Define the process of hydration where ions become surrounded with water molecules in water solution<br>• Describe a simple circuit to measure conductivity of solutions<br>• Relate conductivity to the **concentration of ions** in solution and this to the **solubility** of particular substances<br>**Experiment:** Determine the electrical conductivity and the physical or chemical changes of solutions | 47 | 170–171 | Exp. 4 | 95 | 312–315 | 50,<br>192–193 | | | | | |
| **Homework:** LB p. 171 Act. 3 and 4 | | | | | | | | | | | | |
| **Precipitation reactions** | | 48 | | | | | | | | | | |
| 4 | • Write balanced reaction equations to describe precipitation of insoluble salts | 48 | 172–173 | Act. 4 | 95 | 315–316 | 50, 193 | | | | | |
| **Homework:** LB p. 173–174 Summarise ‘How to test for anions’ | | | | | | | | | | | | |

| Reflection | |
|---|---|
| **Think about and make a note of:** What went well? What did not go well? What did the learners find difficult or easy to understand or do? What will you do to support or extend learners? Did you cover all the work set for the week? If not, how will you get back on track? | What will you change next time? Why? |
| | **HOD:** **Date:** |

## *Platinum Physical Sciences* Week 2: Reactions in aqueous solution

| S # | CAPS concepts, practical activities and assessment tasks | CAPS pp. | LB pp. | LB Act. | TG pp. | *Everything Science* | | Class | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | LB pp. | TG pp. | Date completed | | | | |
| **Precipitation reactions** | | 48–49 | | | | | | | | | | |
| 1 | • Explain how to test for the presence of anions in solution<br>• Identify an ion or ions in a solution from a description of the reactants mixed and the observations of the products | 48 | 174- | Exp. 3 | 96 | 317–319 | 50 | | | | | |
| **Homework:** ES p. 320 Ex. 18.2 | | | | | | | | | | | | |
| 2 | • Identify an ion or ions in a solution from a description of the reactants mixed and the observations of the products | 48 | 176- | Exp. 4 | 96 | 319–320 | 50,<br>193–194 | | | | | |
| **Homework:** ES p. 320 Ex. 18.2 | | | | | | | | | | | | |

| S # | CAPS concepts, practical activities and assessment tasks | CAPS pp. | LB pp. | LB Act. | TG pp. | *Everything Science* | | Date completed | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | LB pp. | TG pp. | | | | | |
| **Other chemical reaction types in water solution** | | 49 | | | | | | | | | | |
| 3 | • Ion exchange reactions<br>• Precipitation reactions<br>• Gas-forming reactions<br>• Acid-base reactions<br>• Redox reactions, which are an electron transfer reaction<br>• Use the charge of the atom to demonstrate how losing or gaining electrons affects the overall charge of an atom | 49 | 177 | Exp. 5 | 97 | 320–322 | 50–51 | | | | | |
| **Homework:** Read p. 170 in preparation | | | | | | | | | | | | |
| 4 | **Recommended experiment for informal assessment**<br>Identify **chemical reaction types** experimentally<br>**Identify** the driving force of each reaction type<br>**Identify** each reaction type in a group of miscellaneous chemical reactions | 49 | 178–179 | Exp. 6 | 97–99 | 322–323 | 50–51 | | | | | |
| **Homework:** LB p. 180 Answer questions and identify reaction types; ES p. 324–326 End-of-chapter exercises | | | | | | | | | | | | |

| Reflection | |
|---|---|
| **Think about and make a note of:** What went well? What did not go well? What did the learners find difficult or easy to understand or do? What will you do to support or extend learners? Did you cover all the work set for the week? If not, how will you get back on track? | What will you change next time? Why? |
| | **HOD:** **Date:** |

## *Platinum Physical Sciences* Week 3: Quantitative aspects of chemical change

| S # | CAPS concepts, practical activities and assessment tasks | CAPS pp. | LB pp. | LB Act. | TG pp. | *Everything Science* | | Class | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | LB pp. | TG pp. | Date completed | | | | |
| **Atomic mass and the mole concept** | | 50–51 | | | | | | | | | | |
| 1 | • Describe the mole as the SI unit for amount of substance<br>• Relate amount of substance to relative atomic mass | 50 | 181–183 | Act. 2 | 101–102 | 327–329 | 50–51, 198–199 | | | | | |
| **Homework:** LB p. 183 Act. 3; ES p. 328–329 Ex. 19.1 | | | | | | | | | | | | |
| **Molecular and formula masses** | | 51 | | | | | | | | | | |
| 2 | • Reason qualitatively and proportionally the relationship between number of moles, mass and molar mass<br>• Calculate mass, molar mass and number of moles according to the relationship: $n = \frac{m}{M}$<br>• Determine the **empirical formula** for a given substance from percentage composition<br>• Determine the number of moles of **water of crystallisation** in salts | 51 | 184–186 | | 101–102 | 329–333<br>Ex. 19.2 | 50–51, 199–203 | | | | | |
| **Homework:** LB pp. 184–186 Revise examples 2–4; ES p. 331 Ex. 19.3 | | | | | | | | | | | | |
| 3 | • Determine the number of moles of **water of crystallisation** in salts<br>**Experiment:** Do an experiment to remove the water of crystallisation from copper(II) sulphate or cobalt(II) chloride and determine the number of moles of water removed from the crystals | 51 | 187–188 | Exp. 1 | 102 | 336–337<br>Act. 19.4 | 50–51, 203–205 | | | | | |
| **Homework:** ES p. 331 Ex. 19.3 | | | | | | | | | | | | |
| **Determining the composition of substances** | | 51 | | | | | | | | | | |
| 4 | • Determine **percent composition** of an element in a compound<br>• Define and determine concentration as moles per volume | 51 | 189–190 | Act. 4<br>Exp. 2 | 103104 | 337–342<br>Ex. 19.5 | 50–51, 206–210 | | | | | |
| **Homework:** LB p. 190 Complete 3 i–m of Exp. 2 | | | | | | | | | | | | |

| Reflection | |
|---|---|
| **Think about and make a note of:** What went well? What did not go well? What did the learners find difficult or easy to understand or do? What will you do to support or extend learners? Did you cover all the work set for the week? If not, how will you get back on track? | What will you change next time? Why? |
| | **HOD:** **Date:** |

## *Platinum Physical Sciences* Week 4: The mole concept

| S # | CAPS concepts, practical activities and assessment tasks | CAPS pp. | LB pp. | LB Act. | TG pp. | *Everything Science* | | Class | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | LB pp. | TG pp. | Date completed | | | | |
| **Determining the composition of substances** | | 51 | | | | | | | | | | |
| 1 | • Determine **percent composition** of an element in a compound<br>• Define and determine concentration as moles per volume | 51 | 191–192 | Exp. 3 | 104–105 | 346–348<br>Ex. 19.6 | 50–51,<br>210–213 | | | | | |
| **Homework:** LB p. 192 Act. 5 | | | | | | | | | | | | |
| **Amount of substance (mole), molar volume of gases, concentration of solutions** | | 51 | | | | | | | | | | |
| 2 | • Calculate the number of moles of a salt with given mass<br>• Define volume<br>• Calculate the molar concentration of a solution | 51 | 193–194 | Act. 8 | 105–106 | 348–350 | 50–51 | | | | | |
| **Basic stoichiometric calculations** | | 52 | | | | | | | | | | |
| 3 | • Do calculations based on concentration, mass, moles, molar mass and volume<br>• Determine the theoretical yield of a product in a chemical reaction, when you start with a known mass of reactant | 52 | 195–197 | Act. 9 | 106 | 350–353 | 50–51 | | | | | |
| **Homework:** LB p. 197 Act. 8 | | | | | | | | | | | | |
| 4 | • Do calculations based on concentration, mass, moles, molar mass and volume<br>• Determine the theoretical yield of a product in a chemical reaction, when you start with a known mass of reactant | 52 | 198 | Exam Practice Q. 1 | 106–107 | 350–353<br>Ex. 19.7 | 50–51,<br>213–216 | | | | | |
| **Homework:** LB p. 198 Exam Practice Q. 2.1–2.4 | | | | | | | | | | | | |

**Reflection**

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| **Think about and make a note of:** What went well? What did not go well? What did the learners find difficult or easy to understand or do? What will you do to support or extend learners? Did you cover all the work set for the week? If not, how will you get back on track? | What will you change next time? Why? |
| | **HOD:** **Date:** |

## *Platinum Physical Sciences* Week 5: Vectors and scalars

| S # | CAPS concepts, practical activities and assessment tasks | CAPS pp. | LB pp. | LB Act. | TG pp. | *Everything Science* | | Class | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | LB pp. | TG pp. | Date completed | | | | |
| **Solutions and chemical change** | | 46–52 | | | | | | | | | | |
| 1 | Complete and revise chemistry | 46–52 | 198–199 | Exam Practice | 106–108 | 355–357 | 50–51,<br>216–227 | | | | | |
| **Homework:** LB p. 198 Exam Practice Q. 2.5–2.7 | | | | | | | | | | | | |
| **Vectors and scalars** | | 53 | | | | | | | | | | |
| 2 | **Introduction to vectors and scalars**<br>• List physical quantities, e.g. time, mass, weight<br>• Define a vector and a scalar quantity | 53 | 202 | Act. 1 | 109 | 358–359 | 51–52,<br>228 | | | | | |
| **Homework:** Read LB pp. 202–203 Adding vectors that are parallel | | | | | | | | | | | | |
| 3 | • Understand that → F represents the force factor, whereas F represents the magnitude of the force factor | 53 | 203 | Act. 2 | 110 | 359–360<br>Ex. 20.1 | 51–52,<br>228 | | | | | |
| **Homework:** ES pp. 359–360 Complete Ex. 20.1 | | | | | | | | | | | | |
| 4 | **Graphical representation of vector quantities**<br>• Properties of vectors, such as equality of vectors, negative vectors, addition, subtraction of vectors using the force vector as example | 53 | 203–204 | Act. 3 | 110–111 | 364–365<br>Ex. 20.3 | 51–52,<br>228–230 | | | | | |
| **Homework:** Complete Act. 3 | | | | | | | | | | | | |

| Reflection | |
|---|---|
| **Think about and make a note of:** What went well? What did not go well? What did the learners find difficult or easy to understand or do? What will you do to support or extend learners? Did you cover all the work set for the week? If not, how will you get back on track? | What will you change next time? Why? |
| | **HOD:** **Date:** |

## *Platinum Physical Sciences* Week 6: Vectors and scalars and motion in one dimension

| S # | CAPS concepts, practical activities and assessment tasks | CAPS pp. | LB pp. | LB Act. | TG pp. | *Everything Science* | | Class | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | LB pp. | TG pp. | Date completed | | | | |
| **Vectors and scalars** | | | | | | | | | | | | |
| 1 | • Define resultant vector<br>• Find resultant vector graphically using the tail-to-head method, as well as by calculation for a maximum of four force vectors **in one dimension only** | 53 | 205–206 | Start Act. 4 | 111–112 | 366–371 | 51–52 | | | | | |
| **Homework:** Complete Act. 4 | | | | | | | | | | | | |
| 2 | • Define resultant vector<br>• Find resultant vector graphically using the tail-to-head method, as well as by calculation for a maximum of four force vectors **in one dimension only** | 53 | 207–209 | Start Act. 5 | 112 | 371–378 Ex. 20.4 | 51–52, 230–234 | | | | | |
| **Homework:** Complete Act. 5 | | | | | | | | | | | | |
| **Motion in one dimension** | | 54–55 | | | | | | | | | | |
| 3 | **Reference frame, position, displacement and distance**<br>• Describe the concept of a frame of reference | 54–55 | 210–211 | Act. 1 | 113–114 | 378–380 Ex. 20.5 | 51–52, 234–238 | | | | | |
| **Homework:** LB p. 211 Act. 2; ES p. 381–385; complete end-of-chapter exercises | | | | | | | | | | | | |
| 4 | **Reference frame, position, displacement and distance**<br>• Position | 54–55 | 211–212 | Case study | 114 | 385–386 | 51–52, 242 | | | | | |
| **Homework:** LB p. 212 Act. 3; ES p. 385–386 Ex. 21.1 | | | | | | | | | | | | |

| Reflection | |
|---|---|
| **Think about and make a note of:** What went well? What did not go well? What did the learners find difficult or easy to understand or do? What will you do to support or extend learners? Did you cover all the work set for the week? If not, how will you get back on track? | What will you change next time? Why? |
| | **HOD:** **Date:** |

## *Platinum Physical Sciences* Week 7: Motion in one dimension

| S # | CAPS concepts, practical activities and assessment tasks | CAPS pp. | LB pp. | LB Act. | TG pp. | *Everything Science* | | Class | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | LB pp. | TG pp. | Date completed | | | | |
| **Motion in one dimension:** | | | | | | | | | | | | |
| 1 | **Reference frame, position, displacement and distance**<br>• Calculate distance and displacement for one dimensional motion | 55 | 213–214 | Act. 4 | 114 | 390–393 Ex. 21.3 (1) | 51–52, 242 | | | | | |
| **Homework:** LB p. 214 read 'Calculating distance and displacement'; ES p. 390–392 Ex. 21.2 | | | | | | | | | | | | |
| 2 | **Average speed, average velocity, acceleration**<br>• Use $\bar{v}$ as a symbol for average velocity<br>• Convert between different units of speed and velocity, e.g. m.s$^{-1}$, km.h$^{-1}$ | 55 | 214–215 | Start Act. 5 | 115–116 | 394 | 51–52, 242–243 | | | | | |
| **Homework:** Complete Act. 5395 | | | | | | | | | | | | |
| 3 | **Average speed, average velocity, acceleration**<br>• Use $\bar{v}$ as a symbol for average velocity<br>• Convert between different units of speed and velocity, e.g. m.s$^{-1}$, km.h$^{-1}$ | 55 | 215–216 | Act. 6 | 116 | 395 | 51–52, 242–245 | | | | | |
| **Homework:** LB p. 216 Act. 7 | | | | | | | | | | | | |
| 4 | **Average speed, average velocity, acceleration**<br>• Time | 55 | 217–218 | Act. 8 | 116–117 | 396–398 Start Ex. 21.4 | 51–52, 242–245 | | | | | |
| **Homework:** Read LB p. 218–219 'Velocity'; ES pp. 386–398 Ex. 21.4 | | | | | | | | | | | | |

**Reflection**

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|---|---|
| **Think about and make a note of:** What went well? What did not go well? What did the learners find difficult or easy to understand or do? What will you do to support or extend learners? Did you cover all the work set for the week? If not, how will you get back on track? | What will you change next time? Why? |
| | **HOD:** **Date:** |

## *Platinum Physical Sciences* Week 8: Velocity, instantaneous velocity, instantaneous speed

| S # | CAPS concepts, practical activities and assessment tasks | CAPS pp. | LB pp. | LB Act. | TG pp. | *Everything Science* | | Class | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | LB pp. | TG pp. | Date completed | | | | |
| **Velocity, instantaneous velocity, instantaneous speed** | | 55 | | | | | | | | | | |
| 1 | **Average speed, average velocity, acceleration**<br>• Velocity | 55 | 218–219 | Act. 9 | 118–119 | 396–398 | 51–52, 242–245 | | | | | |
| **Homework:** LB p. 220 Act. 10 | | | | | | | | | | | | |
| 2 | **Average speed, average velocity, acceleration**<br>• Define average acceleration as the change in velocity divided by time | 56 | 220–222 | Start Act. 11 | 119 | 399–401 | 51–52, 242–245 | | | | | |
| **Homework:** LB p. 221 Complete Act. 11 | | | | | | | | | | | | |
| 3 | **Description of motion in words, diagrams, graphs and equations** | 56–57 | 223–224 | Exp. 1 | 120–122 | 401–405 | 51–52, 242–245 | | | | | |
| **Homework:** LB p. 224 Act. 1 | | | | | | | | | | | | |
| 4 | **Description of motion in words, diagrams, graphs and equations**<br>• Describe the motion of an object given its position vs time graph<br>• Determine the velocity of an object from the gradient of the position vs time graph | 56–57 | 225–227 | Act. 2<br>Act. 3 | 123–125 | 405–407<br>Exp. | 51–52, 242–245 | | | | | |
| **Homework:** LB p. 226 Act. 4 | | | | | | | | | | | | |

| Reflection | |
|---|---|
| **Think about and make a note of:** What went well? What did not go well? What did the learners find difficult or easy to understand or do? What will you do to support or extend learners? Did you cover all the work set for the week? If not, how will you get back on track? | What will you change next time? Why? |
| | **HOD:** **Date:** |

## *Platinum Physical Sciences* Week 9: The equations of motion

| S # | CAPS concepts, practical activities and assessment tasks | CAPS pp. | LB pp. | LB Act. | TG pp. | *Everything Science* | | Class | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | |
| | | | | | | LB pp. | TG pp. | Date completed | | | | |
| 1 | - Describe the motion of an object given its position vs time graph<br>- Determine the velocity of an object from the gradient of the position vs time graph | 56–57 | 227–228 | Start Act. 5 | 126–127 | 407–409 | 51–52 | | | | | |
| **Homework:** LB p. 228 Complete Act. 5 | | | | | | | | | | | | |
| 2 | **Recommended project for formal assessment** | 56–57 | 228–232 | Exp. 2A | 127–129 | 414 | 51–52 | | | | | |
| **Homework:** ES pp. 418–419 Ex. 21.6 | | | | | | | | | | | | |
| 3 | **Recommended project for formal assessment** | 56–57 | 228–232 | Exp. 2B | 129–131 | 414–418 | 51–52,<br>249–250 | | | | | |
| **Homework:** LB p. 231 Act. 5 | | | | | | | | | | | | |
| 4 | - Determine the acceleration of an object from the gradient of the velocity vs time graph<br>- Determine the displacement of an object by finding the area under a velocity vs time graph | 56–57 | 232–234 | Act. 6 | 132 | 410–411 | 51–52 | | | | | |
| **Homework:** LB p. 234 Act. 7; ES pp. 418–418 Ex. 21.6 | | | | | | | | | | | | |

| **Reflection** | |
|---|---|
| **Think about and make a note of:** What went well? What did not go well? What did the learners find difficult or easy to understand or do? What will you do to support or extend learners? Did you cover all the work set for the week? If not, how will you get back on track? | What will you change next time? Why? |
| | **HOD:** **Date:** |

## *Platinum Physical Sciences* Week 10: The equations of motion

| S # | CAPS concepts, practical activities and assessment tasks | CAPS pp. | LB pp. | LB Act. | TG pp. | *Everything Science* | | Class | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | LB pp. | TG pp. | Date completed | | | | |
| 1 | **Average speed, average velocity, acceleration**<br>• Define average acceleration as the change in velocity divided by time | 56–57 | 235–236 | Start Act. 8 | 133–135 | 427–429 | 51–52, 253–254 | | | | | |
| **Homework:** LB p. 236 Complete Act. 8 | | | | | | | | | | | | |
| **The equations of motion (The kinematics equations)** | | | | | | | | | | | | |
| 2 | • Use the kinematics equations to solve problems involving motion in one dimension<br>• Demonstrate an understanding of motion of a vehicle and safety issues | 57 | 237–239 | | 135 | 419–424 Ex. 21.7 (4–7) | 51–52, 254–258 | | | | | |
| **Homework:** LB p. 239 Act. 9 | | | | | | | | | | | | |
| 3 | • Demonstrate an understanding of motion of a vehicle and safety issues, such as the relationship between speed and stopping distance | 57 | 240 | Case study | 136 | 433 Ex. 21.7 (7–10) | 51–52, 259–263 | | | | | |
| **Homework:** LB p. 240 Problems 1 and 2 | | | | | | | | | | | | |
| 4 | • Use the kinematics equations to solve problems involving motion in one dimension | 57 | 240 | Problem 3 | 136–138 | 434 Ex. 21.7 (13–14) | 51–52, 265–269 | | | | | |
| **Homework:** LB p. 240 Problem 4 | | | | | | | | | | | | |

| Reflection | |
|---|---|
| **Think about and make a note of:** What went well? What did not go well? What did the learners find difficult or easy to understand or do? What will you do to support or extend learners? Did you cover all the work set for the week? If not, how will you get back on track? | What will you change next time? Why? |
| | **HOD:** **Date:** |

## *Platinum Physical Sciences* Week 11: Revision and assessment

### End-of-term reflection

**Think about and make a note of:**

1. Was the learners’ performance during the term what you had expected and hoped for? Which learners need particular support with Physical Sciences in the next term? What strategy can you put in place for them to catch up with the class? Which learners would benefit from extension activities? What can you do to help them?
2. With which specific topics did the learners struggle the most? How can you adjust your teaching to improve their understanding of this section of the curriculum in the future?
3. What ONE change should you make to your teaching practice to help you teach more effectively next term?
4. Did you cover all the content as prescribed by the CAPS for the term? If not, what are the implications for your work on these topics in future? What plan will you make to get back **on track**?

**HOD:**

**Date:**

## 3. *Successful Physical Sciences* (Oxford University Press)

| *Successful Physical Sciences* | Week 1: Reactions in aqueous solution | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **S #** | **CAPS concepts, practical activities and assessment tasks** | **CAPS pp.** | **LB pp.** | **LB Act.** | **TG pp.** | ***Everything Science*** | | **Class** | | | | |
| | | | | | | **LB pp.** | **TG pp.** | **Date completed** | | | | |
| **Ions in aqueous solution: their interaction and effects** | | 46 | | | | | | | | | | |
| 1 | • **Explain** how water is able to dissolve ions<br>• **Represent** the dissolution process using balanced equations using the abbreviations (s) and (aq)<br>• **Define** the process of dissolving (solid ionic crystals breaking up into ions in water) | 46 | 180–182 | PA1 | 113 | 309–312<br>Ex. 18.1 | 50, 192 | | | | | |
| **Homework:** LB p. 209 Revision: Ions in aqueous solution | | | | | | | | | | | | |
| 2 | **Practical work**<br>• Investigate different types of solutions<br>• Write balanced equations for each<br>• Investigate different types of reactions in aqueous medium and write balanced ionic equations for the different reaction types<br>**Activity:** Explain what is meant by ion exchange reactions and use an experiment to illustrate the concept of ion exchange reactions | 46 | 182–183 | Act. 21–5 | 113–114 | 310–312 | 50, 192 | | | | | |
| **Homework:** LB p. 183 Act. 2 Q. 6–8 | | | | | | | | | | | | |
| **Electrolytes and extent of ionisation as measured by conductivity** | | 47 | | | | | | | | | | |
| 3 | • Define the process of hydration where ions become surrounded with water molecules in water solution<br>• Describe a simple circuit to measure conductivity of solutions<br>• Relate conductivity to the **concentration of ions** in solution and this to the **solubility** of particular substances<br>**Experiment:** Determine the electrical conductivity and the physical or chemical changes of solutions | 47 | 184–185 | PA1<br>PA3 | 114–115 | 312–315 | 50,<br>192–193 | | | | | |
| **Homework:** LB p. 186–187 Act. 4 and 5 | | | | | | | | | | | | |
| **Precipitation reactions** | | 48 | | | | | | | | | | |
| 4 | • Write balanced reaction equations to describe precipitation of insoluble salts | 48 | 188–189 | PD1 | 116 | 315–316 | 50, 193 | | | | | |
| **Homework:** LB p. 209 Revision: Precipitation reactions | | | | | | | | | | | | |

| **Reflection** | |
|---|---|
| **Think about and make a note of:** What went well? What did not go well? What did the learners find difficult or easy to understand or do? What will you do to support or extend learners? Did you cover all the work set for the week? If not, how will you get back on track? | What will you change next time? Why? |
| | **HOD:** **Date:** |

## *Successful Physical Sciences* Week 2: Reactions in aqueous solution

| **S #** | **CAPS concepts, practical activities and assessment tasks** | **CAPS pp.** | **LB pp.** | **LB Act.** | **TG pp.** | ***Everything Science*** | | **Class** | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | **LB pp.** | **TG pp.** | **Date completed** | | | | |
| **Precipitation reactions** | | 48–49 | | | | | | | | | | |
| 1 | - Explain how to test for the presence of anions in solution<br>- Identify an ion or ions in a solution from a description of the reactants mixed and the observations of the products | 48 | 190 | Act. 2 | 116 | 317–319 | 50 | | | | | |
| **Homework:** ES p. 320 Ex. 18.2 | | | | | | | | | | | | |
| 2 | - Identify an ion or ions in a solution from a description of the reactants mixed and the observations of the products | 48 | 190 | Act. 3 | 116 | 319–320 | 50,<br>194–194 | | | | | |
| **Homework:** ES p. 320 Ex. 18.2 | | | | | | | | | | | | |
| **Other chemical reaction types in water solution** | | 49 | | | | | | | | | | |

| S # | CAPS concepts, practical activities and assessment tasks | CAPS pp. | LB pp. | LB Act. | TG pp. | *Everything Science* | | Date completed | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | LB pp. | TG pp. | | | | | |
| 3 | • Ion exchange reactions<br>• Precipitation reactions<br>• Gas-forming reactions<br>• Acid-base reactions<br>• Redox reactions, which are an electron transfer reaction<br>• Use the charge of the atom to demonstrate how losing or gaining electrons affects the overall charge of an atom | 49 | 191 | Act. 4 | 117 | 320–322 | 50,<br>195–197 | | | | | |
| **Homework:** LB p. 209 Revision: Ion exchange and redox reactions | | | | | | | | | | | | |
| 4 | **Recommended experiment for informal assessment**<br>Identify **chemical reaction types** experimentally<br>**Identify** the driving force of each reaction type<br>**Identify** each reaction type in a group of miscellaneous chemical reactions | 49 | 192–193 | Exp. 1 | 117 | 322–323 | 50,<br>195–197 | | | | | |
| **Homework:** LB p. 193 Act. 2 | | | | | | | | | | | | |

| Reflection | |
|---|---|
| **Think about and make a note of:** What went well? What did not go well? What did the learners find difficult or easy to understand or do? What will you do to support or extend learners? Did you cover all the work set for the week? If not, how will you get back on track? | What will you change next time? Why? |
| | **HOD:** **Date:** |

## *Successful Physical Sciences* Week 3: Quantitative aspects of chemical change

| S # | CAPS concepts, practical activities and assessment tasks | CAPS pp. | LB pp. | LB Act. | TG pp. | *Everything Science* | | Class | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | LB pp. | TG pp. | Date completed | | | | |
| **Atomic mass and the mole concept** | | 50–51 | | | | | | | | | | |
| 1 | • Describe the mole as the SI unit for amount of substance<br>• Relate amount of substance to relative atomic mass | 50 | 194–195 | Act. 1 | 118–119 | 327–329 | 50–51, 198–199 | | | | | |
| **Homework:** LB p. 195 Act. 2; ES pp. 328–329 Ex. 19.1 | | | | | | | | | | | | |
| **Molecular and formula masses** | | 51 | | | | | | | | | | |
| 2 | • Reason qualitatively and proportionally the relationship between number of moles, mass and molar mass<br>• Calculate mass, molar mass and number of moles according to the relationship: $n = \frac{m}{M}$<br>• Determine the **empirical formula** for a given substance from percentage composition<br>• Determine the number of moles of **water of crystallisation** in salts | 51 | 196–198 | Exp. 2 | 119 | 329–333<br>Ex. 19.2 | 50–51, 199–203 | | | | | |
| **Homework:** LB p. 209–210 Revision: Atomic. molecular and formula mass Q. 1 and 2 | | | | | | | | | | | | |
| 3 | • Determine the **empirical formula** for a given substance from percentage composition<br>• Determine the number of moles of **water of crystallisation** in salts<br>**Experiment:** Do an experiment to remove the water of crystallisation from copper(II) sulphate or cobalt(II) chloride and determine the number of moles of water removed from the crystals | 51 | 198–199 | Act. 3 | 119–120 | 336–337<br>Act. 19.4 | 50–51, 203–205 | | | | | |
| **Homework:** LB p. 209–210 Revision: The composition of substances Q. 3–5; ES pp. 331–332 Ex. 19.3 | | | | | | | | | | | | |
| **Determining the composition of substances** | | 51 | | | | | | | | | | |
| 4 | • Determine **percent composition** of an element in a compound<br>• Define and determine concentration as moles per volume | 51 | 200–201 | | 120 | 337–342<br>Ex. 19.5 | 50–51, 206–210 | | | | | |
| **Homework:** LB p. 201 Act. 1 | | | | | | | | | | | | |

| Reflection | |
|---|---|
| **Think about and make a note of:** What went well? What did not go well? What did the learners find difficult or easy to understand or do? What will you do to support or extend learners? Did you cover all the work set for the week? If not, how will you get back on track? | What will you change next time? Why? |
| | **HOD:** **Date:** |

## *Successful Physical Sciences* Week 4: The mole concept

| S # | CAPS concepts, practical activities and assessment tasks | CAPS pp. | LB pp. | LB Act. | TG pp. | *Everything Science* | | Class | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | LB pp. | TG pp. | Date completed | | | | |
| **Amount of substance (mole), molar volume of gases, concentration of solutions** | | 51 | | | | | | | | | | |
| 1 | Calculate the number of moles of a salt with given mass<br>• Define volume | 51 | 202–203 | Act. 1 | 121 | 346–348<br>Ex. 19.6 | 50–51, 210–213 | | | | | |
| **Homework:** LB p. 210 Revision: Mass, molar volume and molar concentration Q. 1–3 | | | | | | | | | | | | |
| 2 | Calculate the molar concentration of a solution | 51 | 202–203 | Act. 2 | 122 | 348–350 | 50–51, 210–213 | | | | | |
| **Homework:** LB p. 210 Revision: Mass, molar volume and molar concentration Q. 4 and 5 | | | | | | | | | | | | |
| **Basic stoichiometric calculations** | | 52 | | | | | | | | | | |
| 3 | • Do calculations based on concentration, mass, moles, molar mass and volume<br>• Determine the theoretical yield of a product in a chemical reaction, when you start with a known mass of reactant | 52 | 204–206 | Act. 1 | 122–125 | 350–353 | 50–51, 210–213 | | | | | |
| **Homework:** LB p. 210 Revision: Basic stoichiometric calculations Q. 1 and 2 | | | | | | | | | | | | |
| 4 | • Do calculations based on concentration, mass, moles, molar mass and volume<br>• Determine the theoretical yield of a product in a chemical reaction, when you start with a known mass of reactant | 52 | 207 | Act. 2 | 125–126 | 350–353<br>Ex. 19.7 | 50–51, 213–216 | | | | | |
| **Homework:** LB p. 210 Revision: Basic stoichiometric calculations Q. 3 | | | | | | | | | | | | |

**Reflection**

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|---|---|
| **Think about and make a note of:** What went well? What did not go well? What did the learners find difficult or easy to understand or do? What will you do to support or extend learners? Did you cover all the work set for the week? If not, how will you get back on track? | What will you change next time? Why? |
| | **HOD:** **Date:** |

## *Successful Physical Sciences* Week 5: Vectors and scalars

| **S #** | **CAPS concepts, practical activities and assessment tasks** | **CAPS pp.** | **LB pp.** | **LB Act.** | **TG pp.** | ***Everything Science*** | | **Class** | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | **LB pp.** | **TG pp.** | **Date completed** | | | | |
| **Solutions and chemical change** | | 46–52 | | | | | | | | | | |
| 1 | • Complete and revise Chemistry | 46–52 | 209–210 | Revision and extension | 128–130 | 355–357 | 50–51, 216–227 | | | | | |
| **Homework:** LB pp. 209–210 Complete revision and extension exercise | | | | | | | | | | | | |
| **Vectors and scalars** | | 53 | | | | | | | | | | |
| 2 | **Introduction to vectors and scalars**<br>• List physical quantities for example time, mass, weight, etc.<br>• Define a vector and a scalar quantity | 53 | 211–213 | | 131–132 | 358–359 | 50–51, 228 | | | | | |
| **Homework:** Read LB p. 213 'Graphical representation of vectors' | | | | | | | | | | | | |
| 3 | • Understand that → F represents the force factor, whereas F represents the magnitude of the force factor | 53 | 213 | PA 1 | 132 | 359–363 Ex. 20.1 | 51, 228 | | | | | |
| 4 | **Graphical representation of vector quantities**<br>• Properties of vectors, such as equality of vectors, negative vectors, addition, subtraction of vectors using the force vector as example | 53 | 214 | | 132 | 364–365 Ex. 20.3 | 51, 228–230 | | | | | |
| **Homework:** LB p. 215 Review Example 1 | | | | | | | | | | | | |

### Reflection

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| **Think about and make a note of:** What went well? What did not go well? What did the learners find difficult or easy to understand or do? What will you do to support or extend learners? Did you cover all the work set for the week? If not, how will you get back on track? | What will you change next time? Why? |
| | **HOD:** **Date:** |

## *Successful Physical Sciences* Week 6: Vectors and scalars and motion in one dimension

| S # | CAPS concepts, practical activities and assessment tasks | CAPS pp. | LB pp. | LB Act. | TG pp. | *Everything Science* | | Class | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | LB pp. | TG pp. | Date completed | | | | |
| **Vectors and scalars** | | | | | | | | | | | | |
| 1 | • Define resultant vector<br>• Find resultant vector graphically using the tail-to-head method, as well as by calculation for a maximum of four force vectors **in one dimension only** | 53 | 214–216 | Act. 2 Q. 1–3 | 132 | 366–371 | 51, 230 | | | | | |
| **Homework:** LB p. 216 Q. 4 and 5 | | | | | | | | | | | | |
| 2 | • Define resultant vector<br>• Find resultant vector graphically using the tail-to-head method, as well as by calculation for a maximum of four force vectors **in one dimension only** | 53 | 216 | Act. 2 Q. 6–7 | 133–134 | 371–378 Ex. 20.4 | 51, 230–237 | | | | | |
| **Homework:** Complete corrections for LB p. 216 Act. 2; ES Ex. 20.5 | | | | | | | | | | | | |
| **Motion in one dimension** | | 54–55 | | | | | | | | | | |
| 3 | **Reference frame, position**<br>• Describe the concept of a frame of reference | 54–55 | 217–218 | Act. 1 (1, 2) | 134 | 381–385 End-of-chapter exercises | 51–52, 238–239 | | | | | |
| **Homework:** LB p. 218 Act. 1 Q. 3–4; ES pp. 381–385 Complete End-of-chapter exercises | | | | | | | | | | | | |
| 4 | **Reference frame, position, displacement and distance:**<br>• Know and illustrate the difference between displacement and distance<br>• Calculate distance and displacement for one-dimensional motion | 54–55 | 219–221 | PD 1 | 134 | 385–386 | 51–52, 239–240 | | | | | |
| **Homework:** LB p. 218 Act. 2; ES pp. 385–386 Ex. 21.1 | | | | | | | | | | | | |

| Reflection | |
|---|---|
| **Think about and make a note of:** What went well? What did not go well? What did the learners find difficult or easy to understand or do? What will you do to support or extend learners? Did you cover all the work set for the week? If not, how will you get back on track? | What will you change next time? Why? |
| | **HOD:** **Date:** |

## *Successful Physical Sciences* Week 7: Motion in one dimension

| S # | CAPS concepts, practical activities and assessment tasks | CAPS pp. | LB pp. | LB Act. | TG pp. | *Everything Science* | | Class | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | LB pp. | TG pp. | Date completed | | | | |
| **Motion in one dimension** | | | | | | | | | | | | |
| 1 | **Average speed, average velocity, acceleration**<br>- Define average speed, which is a scalar quantity | 55 | 222–223 | Act. 1 | 137–138 | 390–393 Ex. 21.3 (1) | 51–52, 242 | | | | | |
| **Homework:** LB p. 223 Act. 1 Q. 1 and 2; ES pp. 390–393 Ex. 21.3(2) | | | | | | | | | | | | |
| 2 | **Average speed, average velocity, acceleration**<br>- Use $\bar{v}$ as a symbol for average velocity<br>- Convert between different units of speed and velocity, e.g. $m.s^{-1}$, $km.h^{-1}$ | 55 | 223–225 | Exp. 2 | 138 | 394 | 51–52, 242–243 | | | | | |
| **Homework:** LB p. 223 Act. 1 Q. 3 and 4; ES pp. 390–393 Ex. 21.3(3) | | | | | | | | | | | | |
| 3 | **Average speed, average velocity, acceleration**<br>- Use $\bar{v}$ as a symbol for average velocity<br>- Convert between different units of speed and velocity, e.g. $m.s^{-1}$, $km.h^{-1}$ | 55 | 223–225 | Act. 3 Q. 1–4 | 138–140 | 395 | 51–52, 243–245 | | | | | |
| **Homework:** LB p. 225 Act. 3 Q. 5–7 | | | | | | | | | | | | |
| 4 | **Average speed, average velocity, acceleration**<br>- Define average acceleration as the change in velocity divided by time | 55 | 226–228 | Start Act. 1 | 140–143 | 396–398 Start Ex. 21.4 | 51–52, 245–246 | | | | | |
| **Homework:** LB p. 228 Complete Act. 1 | | | | | | | | | | | | |

| Reflection | |
|---|---|
| **Think about and make a note of:** What went well? What did not go well? What did the learners find difficult or easy to understand or do? What will you do to support or extend learners? Did you cover all the work set for the week? If not, how will you get back on track? | What will you change next time? Why? |
| | **HOD:** **Date:** |

## *Successful Physical Sciences* Week 8: Instantaneous speed and velocity and the equations of motion

| S # | CAPS concepts, practical activities and assessment tasks | CAPS pp. | LB pp. | LB Act. | TG pp. | *Everything Science* | | Class | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | LB pp. | TG pp. | Date completed | | | | |
| **Instantaneous speed and velocity and the equations of motion** | | 56 | | | | | | | | | | |
| 1 | **Instantaneous velocity, instantaneous speed**<br>• Define instantaneous velocity as the displacement divided by an infinitesimal time interval | 56 | 229–230 | | 143 | 396–398 | 51–52, 247–248 | | | | | |
| **Homework:** LB p. 230 Review Figure 3 and Table 1 | | | | | | | | | | | | |
| 2 | **Instantaneous velocity, instantaneous speed** | 56 | 230–231 | Start Act. 1 | 144–145 | 399–401 | 51–52, 247–248 | | | | | |
| **Homework:** LB p. 230 Complete Act. 1; Review ES pp. 399–401 on instantaneous speed and velocity | | | | | | | | | | | | |
| **The equations of motion** | | 56–57 | | | | | | | | | | |
| 3 | • Description of motion in words, diagrams, graphs and equations | 56–57 | 232–233 | Exp. 1 Steps 1–6 | 144 | 401–405 | 51–52, 247–248 | | | | | |
| **Homework:** LB p. 232 Steps 7–9; ES pp. 403–405 Ex. 21.5 | | | | | | | | | | | | |
| 4 | • Describe the motion of an object given its position vs time graph<br>• Determine the velocity of an object from the gradient of the position vs time graph<br>**Recommended project for formal assessment** | 56–57 | 233 | Exp. 2 | 144 | 405–407 Exp. | 51–52, 247–248 | | | | | |
| **Homework:** LB p. 233 Complete report on investigation (Exp. 2); ES p. 407 Answer Q. 2–4 | | | | | | | | | | | | |

| Reflection | |
|---|---|
| **Think about and make a note of:** What went well? What did not go well? What did the learners find difficult or easy to understand or do? What will you do to support or extend learners? Did you cover all the work set for the week? If not, how will you get back on track? | What will you change next time? Why? |
| | **HOD:** **Date:** |

## *Successful Physical Sciences* Week 9: The equations of motion

| **S #** | **CAPS concepts, practical activities and assessment tasks** | **CAPS pp.** | **LB pp.** | **LB Act.** | **TG pp.** | ***Everything Science*** | | **Class** | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | **LB pp.** | **TG pp.** | **Date completed** | | | | |
| **1** | • Describe the motion of an object given its position vs time graph<br>• Determine the velocity of an object from the gradient of the position vs time graph | 56–57 | 234–236 | | 144 | 407–409 | 51–52 | | | | | |
| **Homework:** LB p. 236 Act. 1; ES p. 409 Review summary of graphs | | | | | | | | | | | | |
| **2** | • Describe the motion of an object given its velocity vs time graph<br>• Determine the velocity of an object from the gradient of the position vs time graph | 56–57 | 237–239 | Start Act. 1 | 144–145 | 414 | 51–52 | | | | | |
| **Homework:** LB p. 239 Complete Act. 1 | | | | | | | | | | | | |
| **3** | • Describe the motion of an object given its velocity vs time graph<br>• Determine the velocity of an object from the gradient of the position vs time graph | 56–57 | 239–243 | Act. 1 p. 239 | 145–149 | 414–418 | 51–52, 249–250 | | | | | |
| **Homework:** Read LB pp. 239–243; ES pp. 418–419 Ex. 21.6 | | | | | | | | | | | | |
| **4** | • Use the kinematics equations to solve problems involving motion in one dimension | 56–57 | 243 | | 149–158 | 410–411 | 51–52, 249–250 | | | | | |
| **Homework:** LB p. 244 Act. 1 Q. 7; ES pp. 418–419 Ex. 21.6 | | | | | | | | | | | | |

| **Reflection** | |
|---|---|
| **Think about and make a note of:** What went well? What did not go well? What did the learners find difficult or easy to understand or do? What will you do to support or extend learners? Did you cover all the work set for the week? If not, how will you get back on track? | What will you change next time? Why? |
| | **HOD:** **Date:** |

## *Successful Physical Sciences* Week 10: The equations of motion

| S # | CAPS concepts, practical activities and assessment tasks | CAPS pp. | LB pp. | LB Act. | TG pp. | *Everything Science* | | Class | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | LB pp. | TG pp. | Date completed | | | | |
| **1** | • Use the kinematics equations to solve problems involving motion in one dimension | 56–57 | 244 | Act. 1 | 149–158 | 427–429 | 51–52, 253 | | | | | |
| **Homework:** LB p. 244 Act. 1 Q. 9; ES pp. 423–424 Ex. 21.7 (1–3) | | | | | | | | | | | | |
| 2 | • Use the kinematics equations to solve problems involving motion in one dimension | 56–57 | 244 | Act. 1 Q. 10.1–10.2 | 149–158 | 419–424 Ex. 21.7 (4–7) | 51–52, 254–256 | | | | | |
| **Homework:** LB p. 244 Act. 1 Q. 10.3 and 10.4; ES pp. 431–432 End-of-chapter Ex. 1–3 | | | | | | | | | | | | |
| 3 | • Demonstrate an understanding of motion of a vehicle and safety issues, such as the relationship between speed and stopping distance | 56–57 | 245–247 | Act. 1 | 158–159 | 433 Ex. 21.7 (7–10) | 51–52, 259–264 | | | | | |
| **Homework:** LB p. 247 Act. 2; ES pp. 431–432 End-of-chapter Ex. 11–12 | | | | | | | | | | | | |
| 4 | • Mechanics (revision and extension) | 53–57 | 259 | Vectors, scalars, motion | 168–173 | 434 Ex. 21.7 (13) | 51–52, 265–269 | | | | | |
| **Homework:** LB p. 259–260 Speed, velocity and the equations of motion; ES p. 435 End-of-chapter Ex. 14–15 | | | | | | | | | | | | |

| Reflection | |
|---|---|
| **Think about and make a note of:** What went well? What did not go well? What did the learners find difficult or easy to understand or do? What will you do to support or extend learners? Did you cover all the work set for the week? If not, how will you get back on track? | What will you change next time? Why? |
| | **HOD:** **Date:** |

## *Successful Physical Sciences* Week 11: Revision and assessment

### End-of-term reflection

**Think about and make a note of:**

1. Was the learners' performance during the term what you had expected and hoped for? Which learners need particular support with Physical Sciences in the next term? What strategy can you put in place for them to catch up with the class? Which learners would benefit from extension activities? What can you do to help them?
2. With which specific topics did the learners struggle the most? How can you adjust your teaching to improve their understanding of this section of the curriculum in the future?
3. What ONE change should you make to your teaching practice to help you teach more effectively next term?
4. Did you cover all the content as prescribed by the CAPS for the term? If not, what are the implications for your work on these topics in future? What plan will you make to get back **on track**?

**HOD:**

**Date:**

# E. ADDITIONAL INFORMATION AND ENRICHMENT ACTIVITIES

| CAPS concepts, practical activities and assessment tasks | Additional information and enrichment activities |
|---|---|
| **Week 1: Reactions in aqueous solutions and types of reactions** | |
| Ions in aqueous solution: their interaction and effects | At this stage, learners should be aware that<br>• Substances that dissolve do not 'melt'<br>• Substances that dissolve do not 'disappear'<br>• Reactions take place in solution<br>Ensure that learners are aware of these things.<br>It is also important to remember that ionic substances dissociate in solution. |
| Types of reactions, e.g. ion exchange reactions, precipitation reactions, gas-forming reactions | **Types of reactions**<br>It is vital that learners experience a variety of chemical reactions. They should become aware that one can observe chemical changes by a change in temperature, bubbling, hissing, the appearance of a new substance or the apparent disappearance of an original substance. You should emphasise that there is no *real* disappearance. Learners could hone their diagnostic skills by observing reactions closely; for example, they should become aware that bubbling indicates the formation of a gas. |
| **Week 2: Reactions in aqueous solutions** | |
| Types of reactions, e.g. ion exchange reactions, precipitation reactions, gas-forming reactions, acid-base reactions and redox reactions | Although we help learners to understand chemical reactions by using quite dramatic examples, it is also important that learners extend their awareness of interactions to include instances where very small changes occur and where changes occur very slowly.<br>Extending this notion, learners should be aware that there are instances where substances do not interact. Learners should not be under the impression that any two (or other number of) substances mixed together will react. They should also be very aware that they should not 'try out' random substances unless supervised by a teacher.<br>Help learners to extend their understanding of oxidation as a chemical reaction by emphasising that oxygen is involved in a number of chemical processes, such as the use of food and fuels in the transfer of energy, some spoilage of food, and rusting. Learners will experience difficulty in understanding aspects of chemical interactions involving oxygen if they do not hold a conservation concept of chemical reactions. |
| **Weeks 3 and 4: Quantitative aspects of chemical change and the mole concept** | |
| Atomic mass and the mole concept; molecular and formula masses; determining the composition of substances | At this point, before embarking on quantitative aspects of chemical change, it would be appropriate to have learners complete Worksheets 1, 2 or 3 (any or all of these) on types of chemical reactions. In this way, you can check whether formulae are accurate, whether equations are balanced and deduce whether or not learners are using a particulate model of matter. Learners who do not yet hold a particulate model of matter can revise work done in Terms 1 and 2. |
| **Week 4: The mole concept** | |
| Amount of substance (mole); molar volume of gases; concentration of solutions; basic stoichiometric calculations | The mole concept is notoriously difficult to teach for a number of reasons:[2]<br>• Inconsistency between the instructional approaches of the textbook and teacher<br>• Confusing mole concept vocabulary<br>• Students' math anxiety and proportional reasoning ability<br>• Learners' cognitive levels<br>• Lack of practice in problem solving<br>Emphasise **repeatedly** that the mole is a number (like a score or a dozen). |

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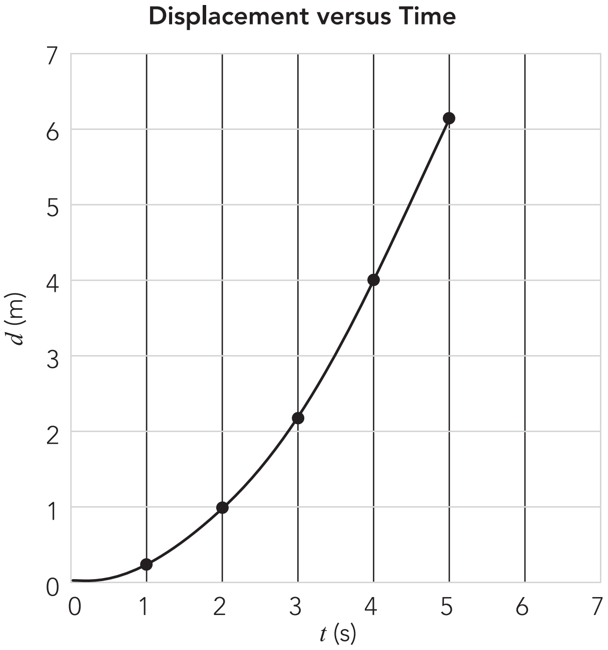
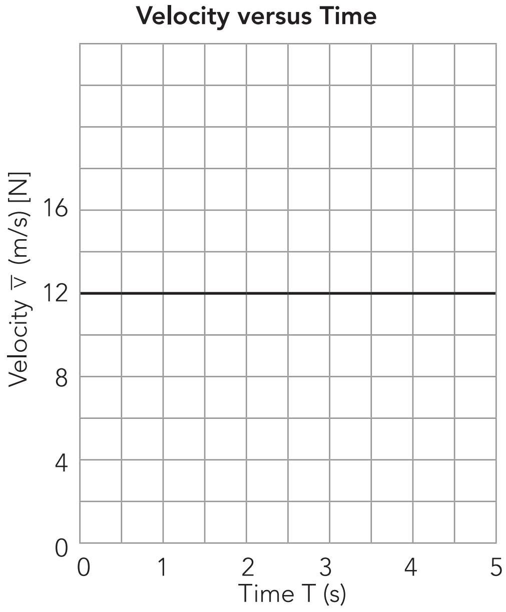
[2] Jane O. Larson, paper presented at the 70th Annual Meeting of the National Association for Research in Science Teaching (Oak Brook, IL, March 21–24, 1997)

| CAPS concepts, practical activities and assessment tasks | Additional information and enrichment activities |
|---|---|
| **Week 4: The mole concept** | |
| **Calculate** the number of moles of a salt with given mass | It is a good idea to focus on the concrete at first. Have learners weigh out moles of salt, sulphur and copper sulphate and look carefully at the results. It will be clear that the volumes of the substances are different. Only when learners understand the concept, will they develop the confidence to solve problems regarding moles, mass and volume.<br>At this point, learners can embark on Worksheets 4 and 5, which deal with **calculations** regarding moles. |
| **Week 5: Introduction to vectors and scalars** | |
| Know and illustrate the difference between displacement and distance<br>Graphical representation of vector quantities | To many learners, the notion of a quantity having a 'direction' makes no sense because the idea is counter-intuitive. Therefore, when introducing the topic of vectors, be sure to explain carefully that the concept is a physics and mathematical one, used to explain certain phenomena. Force is always a good example because the direction component is obvious – more so than displacement. If learners spend some time (preferably outside) pushing and pulling objects, so much the better.<br>When dealing with introductory vector problems, encourage learners to make a drawing (not a graph) of the situation. Let them draw arrows and boxes and even crashes! In this way, they will begin to learn intuitively what the end result will look like. Note that a drawing (e.g. of a tug of war) is one step more abstract than an actual tug of war. Most learners fail to understand vectors and motion if they are led directly to algebraic exercises. |
| **Weeks 7 and 8: Motion in one dimension** | |
| Reference frame, position, displacement and distance | Two basic mathematical concepts are crucial for the understanding of kinematics: the concept of **rate** and the concept of **vector** (including direction and addition).[3] This implies that in kinematics courses the focus should be first on the learning of the **mathematical** concepts. It is therefore important to ensure that learners are familiar with mathematical expressions and concepts.<br>Spend time establishing the concept of position, relative to an observer or fixed reference point. Displacement is defined as the change in position, i.e. the straight line drawn from the initial position to the final position. Note that velocity is the rate of change of position or the rate of displacement. Some older textbooks state that velocity is the rate of change of displacement. This is not correct. |
| **Weeks 9 and 10: Instantaneous speed and velocity and the equations of motion** | |
| Know that the slope of a tangent to a *position vs time* graph yields the instantaneous velocity at that particular time | This particular concept is a good example of the necessity to understand mathematical concepts. Guide learners carefully through the steps of drawing a tangent to the curve before embarking on a calculation. See the comments regarding the *displacement vs time* graph on the next page. |
| Use the kinematics equations to solve problems involving motion in one dimension (horizontal only) | It is your decision whether to teach about motion using graphs first, or to teach about equations first, or to integrate the two approaches. Whatever your decision, you will find extra resources in Worksheets 6, 7 and 8. |

---

[3] Andreas Lichtenberger, Andreas Vaterlaus and Clemens Wagner of the Department of Physics, Zurich, Switzerland

<table>
<tr><th><strong>CAPS concepts, practical activities and assessment tasks</strong></th><th><strong>Additional information and enrichment activities</strong></th></tr>
<tr><td colspan="2"><strong>Weeks 9 and 10: Instantaneous speed and velocity and the equations of motion</strong></td></tr>
<tr><td>Describe the motion of an object given its <em>position vs time</em>, <em>velocity vs time</em> and <em>acceleration vs time</em> graphs</td><td>Consider the <em>displacement vs time</em> graph below. For some learners it is easy to visualise an object gaining velocity (or going faster and faster). It not quite as obvious that the instantaneous velocity is given by the slope of a tangent to the curve.<br><br> <br>Now consider the <em>velocity vs time</em> graph below. When dealing with this graph, ensure that learners are aware that the graph represents the velocity of an object over a period of time <strong>and not</strong> how far an object travels over a period of time. To anyone who is not confident with mathematics, the graph <em>looks like</em> (but is not) a representation of an object travelling along a path.<br><br> <br>Note that in Grade 10, learners are required to deal with constant acceleration <strong>only</strong>.</td></tr>
</table>

# F. ASSESSMENT RESOURCES

## 1. Sample item analysis sheet

*PHYSICAL SCIENCES GRADE 10 TERM 3*

| Learner name | Learner surname | Task 1 Investigation | | | | Physics Written Test | | | | | | Chemistry Written Test | | | | | | Term 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Process skills | | | | Questions | | | | | | Questions | | | | | | Total |
| | | A | B | C | D | 1 | 2 | 3 | 4 | 5 | Total | 1 | 2 | 3 | 4 | 5 | Total | |
| | | | | | | 6 | 16 | 8 | 11 | 9 | 50 | 8 | 7 | 12 | 12 | 11 | 50 | |
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# 2 Physical Sciences Grade 10: End-of-Term 3 Physics Test

**INSTRUCTIONS AND INFORMATION**

1. This question paper consists of 5 questions and an answer sheet.
2. Make sure that your question paper is complete.
3. Read the questions carefully.
4. Write legibly and to set your work out neatly.
5. **Question 1** consists of 3 multiple choice questions. There is only one correct answer to each question. On the answer sheet, place a cross (X) over the letter (A, B, C or D) that corresponds to the most correct answer to each question.
7. Answer **all** questions.
8. **Show all working clearly in all calculations**.
9. Where appropriate round up answers to **two** decimal places.

## *Question 1*

### Multiple choice questions

In each of the following questions, four possible answers are provided. On the answer sheet, place a cross (X) over the letter (A, B, C or D) that corresponds to the most correct answer to each question.

1.1 Which of the following pairs of quantities are BOTH VECTOR quantities?
- A. distance and direction
- B. position and speed
- C. acceleration and velocity
- D. acceleration and distance (2)

1.2 Which of the following statements correctly describes UNIFORM VELOCITY?
The object moves with ….
- A. Constant speed in the same direction.
- B. Constant acceleration in the same direction.
- C. Increases its speed by the same amount in every second.
- D. Increases the distance covered by the same amount in every second. (2)

1.3 What are the correct SI units for the expression '$2a\Delta x$' in the equation of motion?
$v_f^2 = v_i^2 + 2a\Delta x$
- A. m
- B. $m.s^{-1}$
- C. $m.s^{-2}$
- D. $m^2.s^{-2}$ (2)

3 × (2) = **[6]**

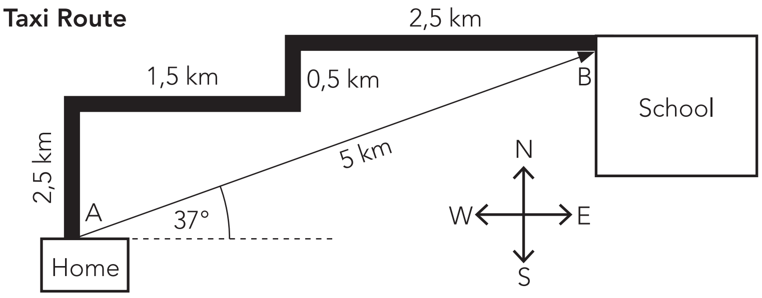
**Show all working in any calculations in the following questions.**

## *Question 2*

Tshepiso travels for 10 minutes in a taxi to school each day. His school is 5 km away from his home when you measure the distance from his door to the school as a straight line AB directed from his door to the school. (Refer to the diagram below.)

The distances along the route that the taxi takes from his home to the school are also shown in the diagram below.

**Taxi Route**



2.1 Define *displacement.* (1)

2.2 Define *distance.* (1)

2.3 Write down Tshepiso's displacement when he travels from home to school. (2)

2.4 Determine the distance that the taxi covers as it takes Tshepiso from his home to the school. (2)

2.5 Determine the average speed of the taxi in $km.h^{-1}$ as it travels from Tshepiso's home to school. (4)

2.6 Determine the magnitude of Tshepiso's average velocity when he travels from home to school. (2)

2.7 Later in the afternoon Tshepiso travels home from school. The taxi takes the same route, and it takes the same time to travel from school to his home. How will the following quantities be affected?

2.7.1 The average speed of the trip. Explain briefly. (2)

2.7.2 Tshepiso's average velocity. Explain briefly. (2)

**[16]**

### *Question 3*

3.1 Define *acceleration*. (1)

3.2 A car travelling at 5 m.s$^{-1}$ accelerates uniformly for 8 s at 2 m.s$^{-2}$ along a straight horizontal road.

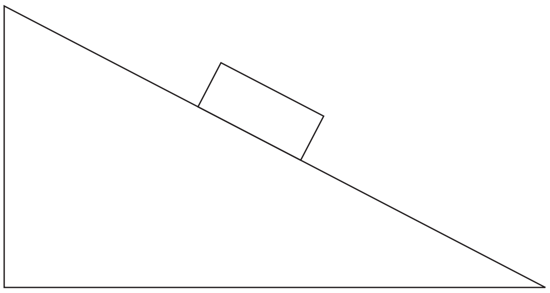
3.2.1 Calculate the magnitude of the velocity of the car after 8 s. (3)

3.2.2 Calculate the distance travelled by the car in 8 s. (4)

**[8]**

### *Question 4*

A block slides from rest down a slope, as shown in the diagram below.



Its position on the slope is measured every 0,5 s and recorded.

| **Table of position and times for a block sliding down a slope** | |
|---|---|
| Time (s) | Position on the slope (m) |
| 0,0 | 0,00 |
| 0,5 | 0,25 |
| 1,0 | 1.00 |
| 1,5 | 2,25 |
| 2,0 | 4,00 |

Use the data in the table above to answer the following questions.

4.1 Draw a position–time graph on the answer sheet supplied. (5)

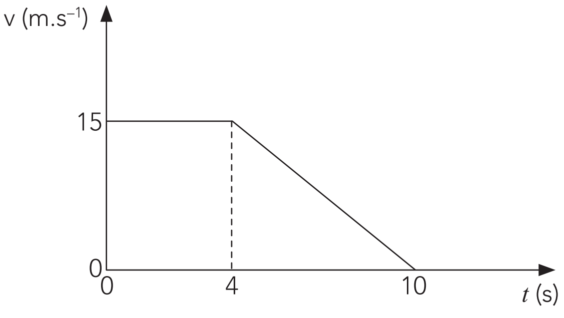
4.2 Describe the motion of the block as it slides down the slope. (2)

4.3 Calculate the acceleration of the block at 1,5 s. (4)

**[11]**

### *Question 5*

The graph below shows the motion of a truck as it approaches a stop street.



5.1 Determine the distance travelled by the truck in 10 s. (5)

5.2 Calculate the acceleration of the truck at 8 s. (4)

**[9]**

**TOTAL MARKS: 50**

**TIME: 1 HOUR**

**END OF TEST**

*Physical Sciences Grade 10: End-of-Term 3 Physics Test*

**ANSWER SHEET**

**NAME:** ______________________________

**Question 1**

Multiple choice questions

| | | | | |
|---|---|---|---|---|
| 1.1 | A | B | C | D |
| 1.2 | A | B | C | D |
| 1.3 | A | B | C | D |
| | | | | TOTAL |

**Question 4.1**

4.1 Sketch position–time graph for block sliding down a slope (5)

## 3. Physical Sciences Grade 10: End-of-Term 3 Physics Test Memorandum

**Question 1**

1.1 C ✓✓ 1.2 A ✓✓ 1.3 D ✓✓

3 × (2) = **[6]**

**Question 2**

2.1 Displacement is the <u>change in position</u> of the object. ✓ (1)

2.2 Distance travelled is the length of the path. ✓ (1)

2.3 5 km ✓ at 37° north of east OR at 53° east of north. ✓ (2)

2.4 Distance = 2,5 + 1,5 + 0,5 + 2,5 ✓ (method)
= 7 km ✓ (accuracy) (2)

2.5 Time = $\frac{15}{60}$ = 0,25 h ✓
Average speed = $\frac{\text{distance}}{\text{time}}$ ✓ (method)
= $\frac{7}{0,25}$ ✓ (substitutions; c.o.e. from 2.4)
= 28 km.h$^{-1}$ ✓ (accuracy) (4)

2.6 Average velocity = $\frac{\text{displacement}}{\text{time}}$
= $\frac{5}{0,25}$ ✓ (substitutions)
= 20 km.h$^{-1}$ ✓ (accuracy) (2)

2.7 2.7.1 The average speed remains the same ✓ because he covers the same distance in the same time. ✓ (2)
2.7.2 The velocity keeps the same magnitude ✓ but it is in the opposite direction. ✓ (2)

**[16]**

**Question 3**

3.1 Acceleration is the rate of change of velocity. ✓ (1)

3.2.1 $v_f = v_i + a\Delta t$ ✓ (method)
= 5 + (2)(8) ✓ (substitutions)
= 21 m.s$^{-1}$✓ (accuracy; SI units) (3)

3.2.2 Alternative 1
$\Delta x = v_i\Delta t + \frac{1}{2}a\Delta t^2$ ✓ (method)
= (5)(8) ✓ + $\frac{1}{2}$(2)(8)$^2$ ✓ (substitutions)
= 104 m ✓ (accuracy; SI units)

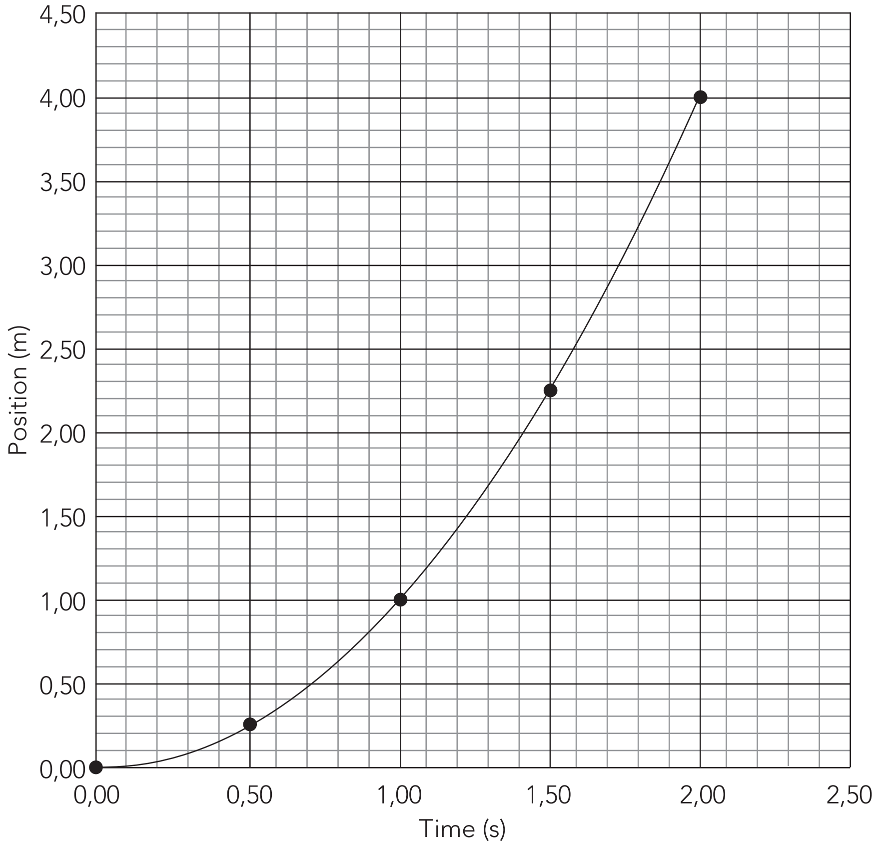
Alternative 2
$v_f^2 = v_i^2 + 2a\Delta x$ ✓ (method)
$(21)^2$ ✓ = (5)2 + 2(2)$\Delta x$ ✓ (substitutions; c.o.e. from 3.2.1)
$\Delta x$ = 104 m ✓ (accuracy; SI units)

Alternative 3
$\Delta x = \frac{1}{2}(v_i + v_f).\Delta t$ ✓ (method)
= $\frac{1}{2}$(5 + 21 ✓)(8) ✓ (substitutions; c.o.e. from 3.2.1)
= 104 m ✓ (accuracy; SI units) (4)

**[8]**

## Question 4

4.1 **Position–Time graph of a block sliding down a slope**



✓ Appropriate title for the graph
✓ Axes labelled correctly with SI units
✓ Position on $y$-axis; time on $x$-axis
✓ Points plotted accurately
✓ Line of best fit drawn with a smooth curve

(5)

4.2 The block accelerates ✓ uniformly ✓ as its slides down the slope OR
The block's velocity increases ✓ by a constant amount ✓ as it slides down the slope. (2)

4.3 $\Delta x = v_i\Delta t + \frac{1}{2}a\Delta t^2$ ✓ (method)
$2{,}25 = 0 +$ ✓ $a(1.5)^2$ ✓ (substitutions)
$a = 2\ m.s^{-2}$ ✓ down the slope ✓ (4)

**[11]**

## Question 5

5.1 Alternative 1
Distance travelled = area under the v–t graph ✓ (method)
$= l \times b + \frac{1}{2}(l)(h)$ ✓ (method)
$= (15)(4)$ ✓ $+ \frac{1}{2}(15)(10 - 4)$ ✓ (substitutions)
$= 105\ m$ ✓ (accuracy; SI units) (5)

Alternative 2
Distance travelled = area under the v–t graph ✓ (method)
$= \frac{1}{2}(l_1 + l_2) \times h$ ✓ (method: area of trapezium)
$= \frac{1}{2}(4 + 10)$ ✓ $\times 15$ ✓ (substitutions)
$= 105\ m$ ✓ (accuracy; SI units) (5)

5.2 $v_f = v_i + a\Delta t$ ✓ (method)
$0 = 15 + a(6)$ ✓ (substitutions)
$a = -2{,}5\ m.s^{-2}$ ✓ (accuracy)
$2{,}5\ m.s^{-2}$ in the opposite direction (backwards) ✓ (explanation) (4)

**[9]**

**TOTAL MARKS: 50**

## 4. Cognitive Analysis for Physical Sciences Grade 10: End-of-Term 3 Physics Test

Level 1: Recall
Level 2: Comprehension
Level 3: Analysis, application
Level 4: Evaluation, synthesis

|  | LEVELS |  |  |  |  |
|---|---|---|---|---|---|
| **QUESTION** | **1** | **2** | **3** | **4** | **TOTAL** |
| 1.1 | 2 |  |  |  | **2** |
| 1.2 |  | 2 |  |  | **2** |
| 1.3 |  |  |  | 2 | **2** |
| 2.1 | 1 |  |  |  | **1** |
| 2.2 | 1 |  |  |  | **1** |
| 2.3 |  |  | 1 | 1 | **2** |
| 2.4 |  | 2 |  |  | **2** |
| 2.5 |  | 2 | 2 |  | **4** |
| 2.6 |  |  | 2 |  | **2** |
| 2.7.1 | 2 |  |  |  | **2** |
| 2.7.2 |  |  | 2 |  | **2** |
| 3.1 | 1 |  |  |  | **1** |
| 3.2.1 |  | 3 |  |  | **3** |
| 3.2.2 |  | 4 |  |  | **4** |
| 4.1 |  | 5 |  |  | **5** |
| 4.2 |  |  | 2 |  | **2** |
| 4.3 |  |  | 4 |  | **4** |
| 5.1 |  |  | 5 |  | **5** |
| 5.2 |  |  | 2 | 2 | **4** |
| MARKS | 7 | 18 | 20 | 5 | **50** |
| % | 14 | 36 | 40 | 10 | **100** |
| TARGET | 15 | 35 | 40 | 10 | **100** |

## 5. Physical Sciences Grade 10: End-of-Term 3 Chemistry Test

INSTRUCTIONS AND INFORMATION

1. This question paper consists of 5 questions and an answer sheet.
2. Make sure that your question paper is complete.
3. Read the questions carefully.
4. Write legibly and to set your work out neatly.
5. **Question 1** consists of 4 multiple-choice questions. There is only one correct answer to each question. On the answer sheet, place a cross (X) over the letter (A, B, C or D) that corresponds to the most correct answer to each question.
7. Answer **all** questions.
8. **Show all working clearly in all calculations**.
9. Where appropriate round up answers to **two** decimal places.

## *Question 1*

**Multiple choice questions**

In each of the following questions, four possible answers are provided. On the answer sheet, place a cross (X) over the letter (A, B, C or D) which corresponds to the most correct answer to each question.

1.1 A mole is defined as …
- A. Avogadro's number
- B. The mass of 12 g of the substance
- C. The number of particles contained in 12 g of carbon-12 isotope
- D. The mass of the substance divided by its molar mass (2)

1.2 Ammonia gas is prepared in industry by reacting hydrogen with nitrogen in the presence of a catalyst. The balanced equation for this reaction is: $N_2\ (g) + 3\ H_2\ (g) \rightarrow 2\ NH_3\ (g)$

What is the maximum mass of ammonia that can be produced from 35 g of nitrogen reacting completely with an excess of hydrogen gas?
- A. 1,25 g
- B. 2,50 g
- C. 21,25 g
- D. 42,50 g (2)

1.3 Which of the following reactions is a precipitation reaction?
- A. $Na_2CO_3 + 2\ HC\ell \rightarrow 2\ NaC\ell + CO_2 + H_2O$
- B. $H_2SO_4 + CuO \rightarrow CuSO_4 + H_2O$
- C. $2\ HNO_3 + Ag_2CO_3 \rightarrow 2\ AgNO_3 + CO_2 + H_2O$
- D. $AgNO_3 + NaC\ell \rightarrow AgC\ell + NaNO_3$ (2)

1.4 Name the process in which water molecules pack around an ion.
- A. Dehydration
- B. Hydration
- C. Ionisation
- D. Dissociation (2)

4 × (2) = **[8]**

## *Question 2*

2.1 Write a balanced equation to show what happens when $NaC\ell$ (s) dissolves in water. (2)

2.2 Explain what is meant by 'a polar molecule' with reference to a water molecule. (2)

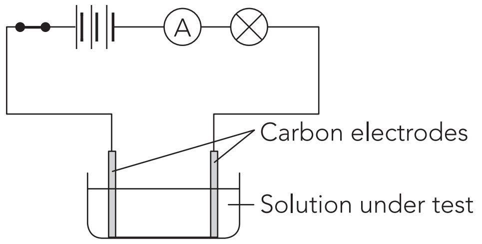
2.3 Using clearly labelled diagrams show the interactions between the different particles when $NaC\ell$ (s) dissolves in water. (3)

**[7]**

## *Question 3*

A battery is connected to two carbon electrodes, a lamp and an ammeter to measure the conductivity of various solutions.

The diagram shows the circuit diagram of the apparatus.



3.1 Give one word for 'a solution which conducts electric current.' (1)

3.2 Explain, in terms of the motion of particles in the solution, how a solution of potassium chloride conducts electric current. (4)

3.3 Gas is released at each of the carbon electrodes when an electric current is passed through potassium chloride.

3.3.1 Is this a chemical or a physical change? Explain briefly. (2)

3.3.2 Identify the gases that are released. (2)

3.4 Sugar solution does not conduct electric current. Explain, in terms of the particles in the sugar solution, why electric current cannot pass through a solution of sugar. (3)

**[12]**

## *Question 4*

A solution that contains two unidentified sodium salts is placed in a beaker. An analytical chemist performs the following tests on the contents of the beaker, and records the results of each test.

| **Test** | **Result** |
|---|---|
| Add a few drops of silver nitrate to 10 ml of the solution in a test tube.<br>Observe what happens.<br>Add a few drops of concentrated nitric acid. | A yellow precipitate formed.<br>The precipitate remained in the test tube when nitric acid was added. |
| Add a few drops of barium nitrate to 10 ml of solution in a test tube.<br>Observe what happens.<br>Add a few drops of concentrated nitric acid. | A cloudy precipitate formed.<br>The precipitate dissolved when nitric acid was added.<br>Bubbles of gas escaped when the acid was added. |

**USEFUL FACTS**

Insoluble salts:

| | |
|---|---|
| $BaSO_4$ | white |
| $BaCO_3$ | white |
| $AgC\ell$ | white (turns grey in presence of light) |
| AgBr | cream |
| AgI | yellow |

4.1 Name the yellow precipitate formed when silver nitrate was added to the solution. (2)

4.2 Write a balanced chemical equation for the reaction that occurred when silver nitrate was added to the sodium salt solution. Include the symbols (s), (aq) etc to show the states. (3)

4.3 Name the precipitate that formed when barium nitrate was added to the solution. (2)

4.4 Write a balanced chemical equation for the reaction that occurred when barium nitrate was added to the sodium salt solution. Include the symbols to show the states. (3)

4.5 Identify the gas that was given off when concentrated nitric acid was added to the solution of the unknown sodium salt and barium nitrate. (2)

**[12]**

## *Question 5*

5.1 When blue copper(II) sulfate is heated to drive off the water of crystallisation, the following results are obtained:

| | |
|---|---|
| Mass of $CuSO_4.nH_2O$ | 25 g |
| Mass of $CuSO_4$ (dehydrated) | 16 g |

Determine the number of moles of water of crystallisation ($n$). (4)

5.2 The percentage composition of a compound is shown in the table below:

| | |
|---|---|
| carbon | 48,65% |
| hydrogen | 8,11% |
| oxygen | 43,24% |

Determine the empirical formula of the compound. (4)

5.3 What mass of (anhydrous) sodium hydroxide is needed to make 250 $cm^3$ of solution with a concentration of 1,5 $mol.dm^{-3}$? (3)

**[11]**

**TOTAL MARKS: 50**

**TIME: 1 HOUR**

**END OF TEST**

## *Physical Sciences Grade 10: End-of-Term 3 Chemistry Test*

### ANSWER SHEET

**NAME:** ______________________________

**Question 1**

Multiple choice questions

| | | | | |
|---|---|---|---|---|
| 1.1 | A | B | C | D |
| 1.2 | A | B | C | D |
| 1.3 | A | B | C | D |
| 1.4 | A | B | C | D |
| TOTAL | | | | |

# 6. Physical Sciences Grade 10: End-of-Term 3 Chemistry Test Memorandum

**Question 1**

1.1 C ✓✓ 1.2 D ✓✓ 1.3 D ✓✓ 1.4 B ✓✓

4 × (2) = **[8]**

**Question 2**

2.1 $NaC\ell\ (s) \rightarrow Na^+\ (aq)$ ✓ + $C\ell^-\ (aq)$ ✓ (–1 if (aq) is omitted) (2)

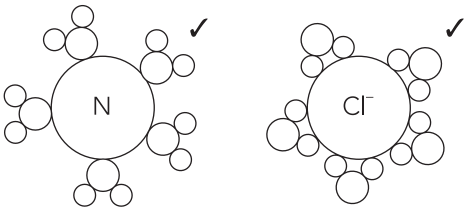
2.2 A polar molecule has an uneven distribution of charge (has one part of it slightly negatively charged and the other side of it slightly positively charged). ✓

Water is a polar molecule. It has a slight negative charge over the oxygen atom, and a slight positive charge over the hydrogen atoms. ✓ OR equivalent information in a diagram. (2)

2.3 [The diagram should show the following:

The positive sides of the water molecules are attracted to the negative sulfate ion.

Similarly, the negative sides of the water molecules are attracted to the positive copper ion.]



Water molecules cluster around the (positive and negative) ions.

OR Water molecules hydrate the ions. ✓ (3)

**[7]**

**Question 3**

3.1 electrolyte ✓ (1)

3.2 Positive $K^+$ ions move towards the negative electrode. ✓

Negative $C\ell^-$ ions move towards the positive electrode. ✓

The movement of ions ✓ in the solution constitutes the electric current. ✓ (4)

3.3 3.3.1 A chemical reaction. ✓ New substances are formed. ✓ (2)

3.3.2 Hydrogen ($H_2$) ✓ and chlorine ($C\ell_2$) ✓ (2)

3.4 When sugar dissolves in water, the molecules in the sugar crystals are pulled away from each other by the water molecules. ✓ The sugar molecules then spread out between the water molecules as a sugar water solution is formed. There are no ions in a sugar solution, therefore there are no charged particles ✓ free to move through the solution conducting a current. ✓ (3)

**[12]**

**Question 4**

4.1 silver iodide ✓✓ (No marks for the formula) (2)

4.2 $NaI\ (aq) + AgNO_3\ (aq) \rightarrow AgI\ (s) + NaNO_3\ (aq)$
(reactants correct ✓ products correct ✓ state correct ✓) (3)

4.3 barium carbonate ✓✓ (No marks for the formula) (2)

4.4 $Na_2CO_3\ (aq) + Ba(NO_3)_2\ (aq) \rightarrow BaCO_3\ (s) + 2\ NaNO_3\ (aq)$
(reactants correct ✓ products correct ✓ state correct ✓) (3)

4.5 carbon dioxide OR $CO_2$ ✓✓ (2)

**[12]**

**Question 5**

5.1 Mass of water = 25 – 16 = 9 g

No. of mol of water = $\frac{m}{M}$ ✓ (method)

= $\frac{9}{18}$ ✓

= 0,50 mol ✓ (accuracy)

Mass of $CuSO_4$ = 16 g

No. of mol of $CuSO_4$ = $\frac{m}{M}$

= $\frac{16}{159,5}$

= 0,10 mol ✓ (accuracy)

There are 0,5 mol water for each 0,1 mol $CuSO^4$

Therefore $CuSO_4.5\ H_2O$ ✓ (accuracy) (4)

5.2

| In 100 g of compound | C | H | O | |
|---|---|---|---|---|
| Mass | 48,65 | 8,11 | 43,24 | |
| $n = \frac{m}{M}$ | $\frac{48,65}{12}$ = 4,05 | $\frac{8,11}{1}$ = 8,11 | $\frac{43,24}{16}$ = 2,70 | ✓ |
| Ratio | 1,5 | 3 | 1 | ✓ |
| Ratio × | 3 | 6 | 2 | ✓ |

Formula: $C_3H_6O_2$ ✓ (4)

5.3 Concentration = $\frac{n}{V}$

1,5 = $\frac{n}{0,250}$ ✓ (applying the method)

$n$ = 0,375 mol

mass = $nM$

= (0,375)(40) ✓ (correct relative atomic mass)

= 15 g ✓ (accuracy; SI units) (3)

**[11]**

**TOTAL MARKS: 50**

## 7. Cognitive Analysis for Physical Sciences Grade 10: End-of-Term 3 Chemistry Test

Level 1: Recall
Level 2: Comprehension
Level 3: Analysis, application
Level 4: Evaluation, synthesis

| | LEVELS | | | | |
|---|---|---|---|---|---|
| **QUESTION** | **1** | **2** | **3** | **4** | **TOTAL** |
| 1.1 | 2 | | | | **2** |
| 1.2 | | | | 2 | **2** |
| 1.3 | | 2 | | | **2** |
| 1.4 | 2 | | | | **2** |
| 2.1 | | 2 | | | **2** |
| 2.2 | | 2 | | | **2** |
| 2.3 | | 3 | | | **3** |
| 3.1 | 1 | | | | **1** |
| 3.2 | | 2 | 2 | | **4** |
| 3.3.1 | | 2 | | | **2** |
| 3.3.2 | | 2 | | | **2** |
| 3.4 | | 2 | 1 | | **3** |
| 4.1 | 2 | | | | **2** |
| 4.2 | | | 3 | | **3** |
| 4.3 | | | 2 | | **2** |
| 4.4 | | | | 3 | **3** |
| 4.5 | | | 2 | | **2** |
| 5.1 | | | 4 | | **4** |
| 5.2 | | | 4 | | **4** |
| 5.3 | | 3 | | | **3** |
| TOTAL | 7 | 21 | 18 | 5 | **50** |
| % | 14 | 42 | 36 | 10 | **100** |
| TARGET % | 15 | 40 | 35 | 10 | **100** |

# G. ADDITIONAL WORKSHEETS

## 1. Worksheet 1

Write balanced chemical equations for the following **synthesis** (combining) reactions:

1. calcium + oxygen → calcium oxide

________________________________________________

2. copper + sulfur → copper(II) sulfide

________________________________________________

3. calcium oxide + water → calcium hydroxide

________________________________________________

4. hydrogen + nitrogen → ammonia

________________________________________________

5. hydrogen + chlorine → hydrogen chloride

________________________________________________

6. silver + sulfur → silver sulfide

________________________________________________

7. chromium + oxygen → chromium(III) oxide

________________________________________________

8. aluminium + bromine → aluminium bromide

________________________________________________

9. sodium + iodine → sodium iodide

________________________________________________

10. hydrogen + oxygen → water

________________________________________________

11. aluminium + oxygen → aluminium oxide

________________________________________________

## 2. Answers for Worksheet 1

1. calcium + oxygen → calcium oxide

   $2\ Ca + O_2 \rightarrow 2\ CaO$

2. copper + sulfur → copper(II) sulfide

   $8\ Cu + S_8 \rightarrow 8CuS$

3. calcium oxide + water → calcium hydroxide

   $CaO + H_2O \rightarrow Ca(OH)_2$

4. hydrogen + nitrogen → ammonia

   $3\ H_2 + N_2 \rightarrow 2\ NH_3$

5. hydrogen + chlorine → hydrogen chloride

   $H_2 + C\ell_2 \rightarrow 2\ HC\ell$

6. silver + sulfur → silver sulfide

   $16\ Ag + S_8 \rightarrow 8\ Ag_2S$

7. chromium + oxygen → chromium(III) oxide

   $4\ Cr + 3\ O_2 \rightarrow 2\ Cr_2O_3$

8. aluminium + bromine → aluminium bromide

   $2\ A\ell + 3\ Br_2 \rightarrow 2\ A\ell Br_3$

9. sodium + iodine → sodium iodide

   $2\ Na + I_2 \rightarrow 2\ NaI$

10. hydrogen + oxygen → water

    $2\ H_2 + O_2 \rightarrow 2\ H_2O$

11. aluminium + oxygen → aluminium oxide

    $4\ A\ell + 3\ O_2 \rightarrow 2\ A\ell_2O_3$

## 3. Worksheet 2

Complete the following **precipitation** equations.

**Note:**

- Precipitates are insoluble and are followed by (s)
- Substances in solution are followed by (aq)

Refer to the tables at the bottom of the page:

- List of insoluble salts that are precipitates
- List of polyatomic ions that always stay together as a unit

1. $Ba(NO_3)_2$ (aq) + $K_2SO_4$ (aq) → ______________________________

2. $AgNO_3$ (aq) + NaBr (aq) → ______________________________

3. $FeCl_3$ (aq) + 3 KOH (aq) → ______________________________

4. $Pb(NO_3)_2$ (aq) + $K_2SO_4$ (aq) → ______________________________

5. $Cu(NO_3)_2$ (aq) + 2 NaOH → ______________________________

| **List of insoluble salts** | | |
|---|---|---|
| $AgC\ell$ | silver chloride | white |
| $Ag_2CrO_4$ | silver chromate | red |
| $AgIO_3$ | silver iodate | white |
| AgI | silver iodide | yellow |
| $BaSO_4$ | barium sulfate | white |
| $Cu(OH)_2$ | copper(II) hydroxide | blue |
| $Fe(OH)_3$ | iron(III) hydroxide | red |
| $PbCrO_4$ | lead(II) chromate | yellow |
| $PbI_2$ | lead(II) iodide | yellow |
| $PbSO_4$ | lead(II) sulfate | white |
| **List of polyatomic ions** | | |
| $NH_4^+$ | ammonium | |
| $OH^-$ | hydroxide | |
| $NO_3^-$ | nitrate | |
| $CO_3^{2-}$ | carbonate | |
| $SO_4^{2-}$ | sulfate | |
| $PO_4^{3-}$ | phosphate | |

## 4. Answers for Worksheet 2

1. $Ba(NO_3)_2\ (aq) + K_2SO_4\ (aq) \rightarrow BaSO_4\ (s) + 2\ K^+\ (aq) + 2\ NO_3^-\ (aq)$

2. $AgNO_3\ (aq) + NaBr\ (aq) \rightarrow AgBr\ (s) + Na^+\ (aq) + NO_3^-\ (aq)$

3. $FeCl_3\ (aq) + 3\ KOH\ (aq) \rightarrow Fe(OH)_3\ (s) + 3\ K^+\ (aq) + 3\ Cl^-\ (aq)$

4. $Pb(NO_3)_2\ (aq) + K_2SO_4\ (aq) \rightarrow PbSO_4\ (s) + 2\ K^+\ (aq) + 2\ NO_3^-\ (aq)$

5. $Cu(NO_3)_2\ (aq) + 2\ NaOH \rightarrow Cu(OH)_2\ (s) + 2\ Na^+\ (aq) + 2\ NO_3^-\ (aq)$

## 5. Worksheet 3

Complete the following word equations, and write the balanced chemical equations for the following decomposition reactions:

1. barium carbonate → ____________________
2. magnesium carbonate → ____________________
3. potassium carbonate → ____________________
4. zinc hydroxide → ____________________
5. iron(II) hydroxide → ____________________
6. nickel(II) chlorate → ____________________
7. sodium chlorate → ____________________
8. potassium chlorate → ____________________
9. sulfuric acid → ____________________
10. carbonic acid → ____________________
11. aluminium oxide → ____________________
12. silver oxide → ____________________

## 6. Answers for Worksheet 3

1. barium carbonate → barium oxide + carbon dioxide

   $BaCO_3 \rightarrow BaO + CO_2$

2. magnesium carbonate → magnesium oxide + carbon dioxide

   $MgCO_3 \rightarrow MgO + CO_2$

3. potassium carbonate → potassium oxide + carbon dioxide

   $K_2CO_3 \rightarrow K_2O + CO_2$

4. zinc hydroxide → zinc oxide + water

   $Zn(OH)_2 \rightarrow ZnO + H_2O$

5. iron(II) hydroxide → iron(II) oxide + water

   Fe(OH)2 → FeO + H2O

6. nickel(II) chlorate → nickel(II) chloride + oxygen

   $Ni(C\ell O_3)_2 \rightarrow NiC\ell_2 + 3\ O_2$

7. sodium chlorate → sodium chloride + oxygen

   $2\ NaC\ell O_3 \rightarrow 2\ NaC\ell + 3\ O_2$

8. potassium chlorate → potassium chloride + oxygen

   $2\ KC\ell O_3 \rightarrow 2\ KC\ell + 3\ O_2$

9. sulfuric acid → water + sulfur trioxide

   $H_2SO_4 \rightarrow H_2O + SO_3$

10. carbonic acid → water + carbon dioxide

    $H_2CO_3 \rightarrow H_2O + CO_2$

11. aluminium oxide → aluminium + oxygen

    $2\ A\ell_2O_3 \rightarrow 4\ A\ell + 3\ O_2$

12. silver oxide → silver + oxygen

    $2\ Ag_2O \rightarrow 4\ Ag + O_2$

## 7. Worksheet 4

Calculate the moles present in the following examples and show your workings in the spaces provided.

**Note:** When calculating molar masses, you may ignore isotopes. In other words, use whole numbers when calculating molar masses.

Example

**Given:** 2,00 g

**Quick calculation:** Molar mass of $H_2O$ is 2 + 16 = 18 grams/mole

**Proportional analysis:** number of grams/number of moles equals molar mass/1 mole

2,00 g/unknown number of moles = 18 g/1 mole
unknown number of moles/2 g = 1 mole/18 g per mole
unknown number of moles = 2 g/18 g per mole
= 0,111 moles

1. 2,00 g of $H_2O$

2. 75,57 g of KBr

3. 100 g of $KC\ell O_4$

4. 8,76 g of NaOH

5. 0,750 g of $Na_2CO_3$

## 8. Answers for Worksheet 4

1. 2,00 g of $H_2O$

    2,00 g/unknown number of moles = 18 g/1 mole
    unknown number of moles/2,00 g = 1 mole/18 g per mole
    unknown number of moles = 2 g/18 g per mole
    = 0,111 moles

2. 75,57 g of KBr

    75,57 g/unknown number of moles = 119 g/1 mole
    unknown number of moles/75,57 g = 1 mole/119 g per mole
    unknown number of moles = 75,57 g/119 g per mole
    = 0,635 moles

3. 100 g of $KC\ell O_4$

    100 g/unknown number of moles = 138 g/1 mole
    unknown number of moles/100 g = 1 mole/138 g per mole
    unknown number of moles = 100 g/138 g per mole
    = 0,722 moles

4. 8,76 g of NaOH

    8,76 g/unknown number of moles = 40 g/1 mole
    unknown number of moles/8,76 g = 1 mole/40 g per mole
    unknown number of moles = 8,76 g/40 g per mole
    = 0,219 moles

5. 0,750 g of $Na_2CO_3$

    0,75 g/unknown number of moles = 106 g/1 mole
    unknown number of moles/0,75 g = 1 mole/106 g per mole
    unknown number of moles = 0,75 g/106 g per mole
    = 0,00798 moles

## 9. Worksheet 5

Calculate the number of moles in the masses listed below. You do not have to show your workings.

1. 26,0 g $Ca(C\ell O_4)_2$ ____________________
2. 32,0 g $O_2$ ____________________
3. 34,2 g $NH_3$ ____________________
4. 9,00 g $H_2SO_4$ ____________________
5. 59,3 g $SnF_2$ ____________________
6. 0,00500 g $XeO_3$ ____________________
7. 10,0 g $SO_3$ ____________________
8. 1,00 g $CO_2$ ____________________
9. 5,00 g $CaCO_3$ ____________________
10. 1,00 g $NaC\ell$ ____________________
11. 98,9 g NaI ____________________
12. 14,0 g N ____________________
13. 5,08 g $XeF_4$ ____________________
14. 10,0 g $V_2O_5$ ____________________
15. 2,50 g $K_2Cr_2O_7$ ____________________
16. 10,00 g $Na_2CO_3$ ____________________
17. 3,091 g $K_2SO_4$ ____________________
18. 20,00 g KOH ____________________
19. 0,0089 g $IF_7$ ____________________
20. 32,58 g CuS ____________________
21. 1,00 g $Ba(OH)_2$ ____________________
22. 2,001 g $A\ell_2O_3$ ____________________
23. $2,00 \times 10^{-3}$ g $NH_4NO_3$ ____________________
24. 0,0010 g $A\ell(MnO_4)_3$ ____________________

## 10. Answers for Worksheet 5

| | | |
|---|---|---|
| 1. | 26,0 g $Ca(C\ell O_4)_2$ | 0,109 moles |
| 2. | 32,0 g $O_2$ | 1,00 moles |
| 3. | 34,2 g $NH_3$ | 2,01 moles |
| 4. | 9,00 g $H_2SO_4$ | 0,0918 moles |
| 5. | 59,3 g $SnF_2$ | 0,378 moles |
| 6. | 0,00500 g $XeO_3$ | 0,0000279 moles |
| 7. | 10,0 g $SO_3$ | 0,125 moles |
| 8. | 1,00 g $CO_2$ | 0,0227 moles |
| 9. | 5,00 g $CaCO_3$ | 0,0500 moles |
| 10. | 1,00 g $NaC\ell$ | 0,0171 moles |
| 11. | 98,9 g NaI | 0,660 moles |
| 12. | 14,0 g N | 0,500 moles |
| 13. | 5,08 g $XeF_4$ | 0,0245 moles |
| 14. | 10,0 g $V_2O_5$ | 0,0550 moles |
| 15. | 2,50 g $K_2Cr_2O_7$ | 0,00850 moles |
| 16. | 10,00 g $Na_2CO_3$ | 0,0945 moles |
| 17. | 3,091 g $K_2SO_4$ | 0,0177 moles |
| 18. | 20,00 g KOH | 0,356 moles |
| 19. | 0,0089 g $IF_7$ | 0,0000342 moles |
| 20. | 32,58 g CuS | 0,3408 moles |
| 21. | 1,00 g $Ba(OH)_2$ | 0,00584 moles |
| 22. | 2,001 g $A\ell 2O_3$ | 0,01962 moles |
| 23. | $2,00 \times 10^{-3}$ g $NH_4NO_3$ | 0,0000250 moles |
| 24. | 0,0010 g $A\ell(MnO_4)_3$ | 0,0000026 moles |

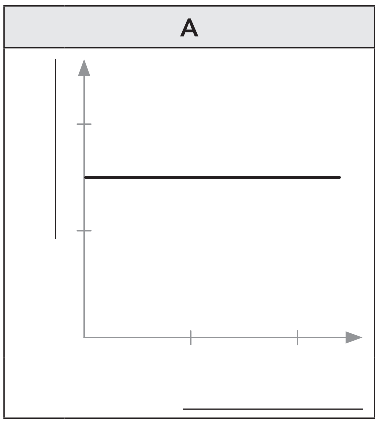
## 11. Worksheet 6

Figures A to C represent a series of graphs illustrating a particular type of motion; as do graphs D to F and graphs G to I. Each **series** shows a particular type of motion under different conditions.

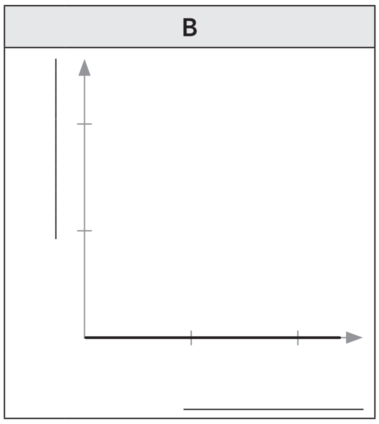
1. In the spaces provided, write the captions or headings for each **series** of graphs.
   HINT: What type of motion is shown?
2. On each and every graph, label both the vertical and horizontal axes.
   HINT: Time in seconds or *t (s)*

Caption (heading) for graphs A to C: ______________________________

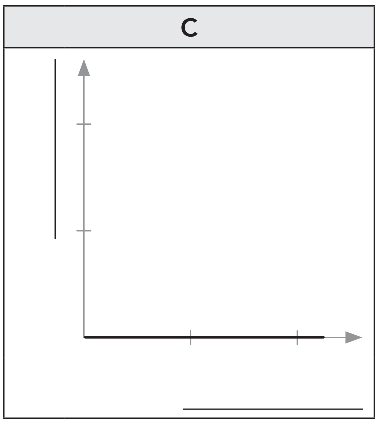
**A**



**B**

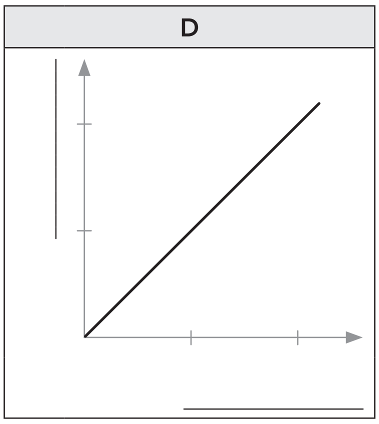


**C**

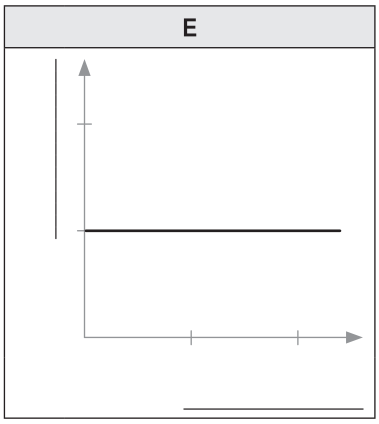


Caption (heading) for graphs D to F: ______________________________

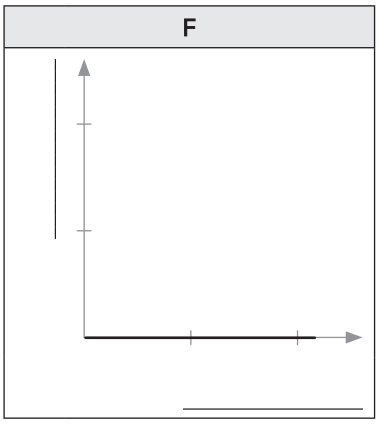
**D**



**E**

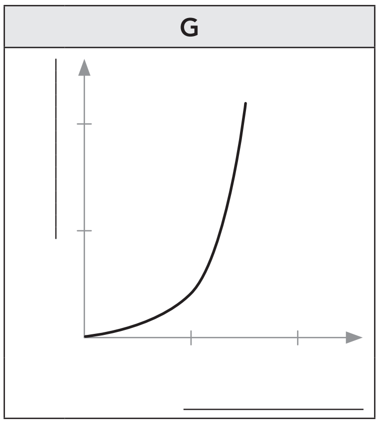


**F**

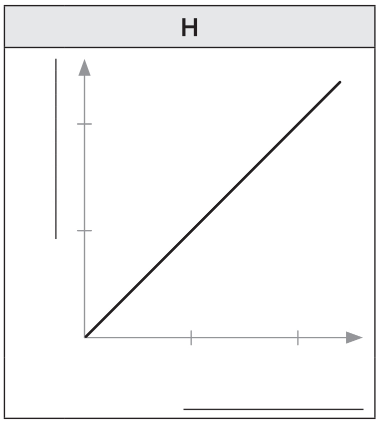


Caption (heading) for graphs G to I: ______________________________

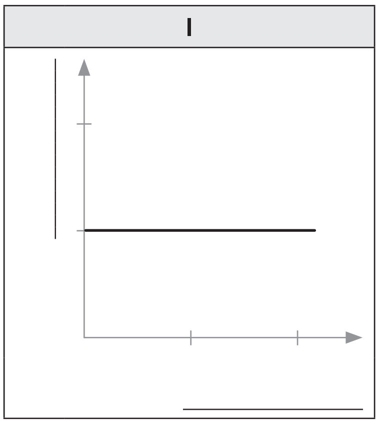
**G**



**H**



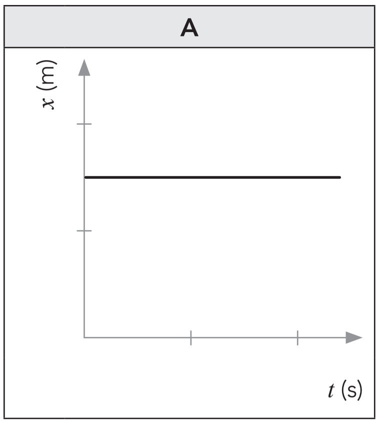
**I**



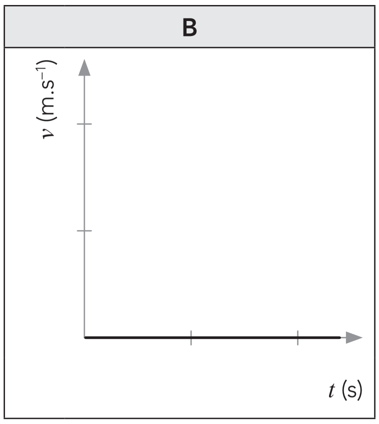
## 12. Answers for Worksheet 6

Stationary object

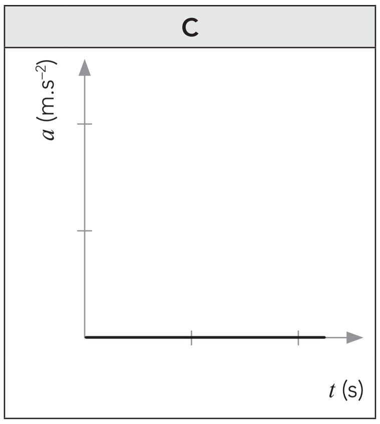
**A**



**B**

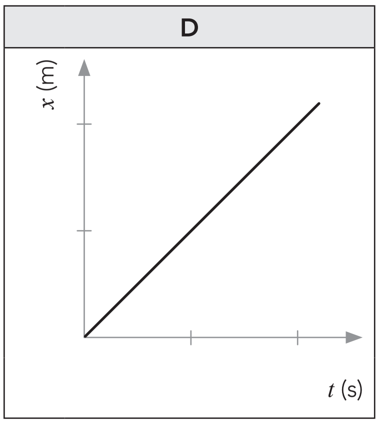


**C**

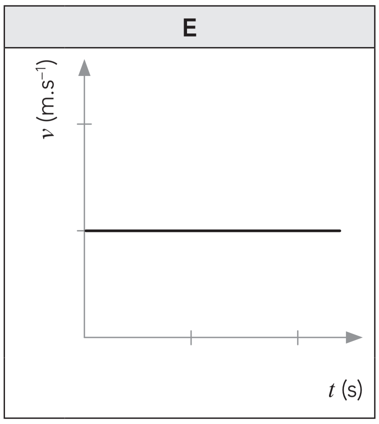


Uniform motion

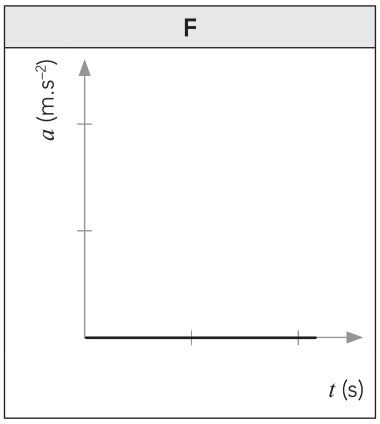
**D**



**E**

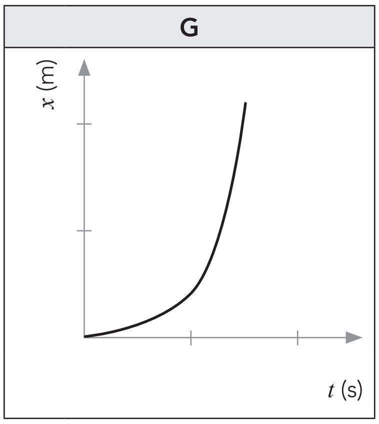


**F**

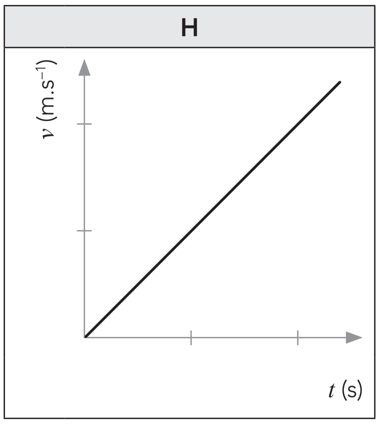


Motion with constant acceleration

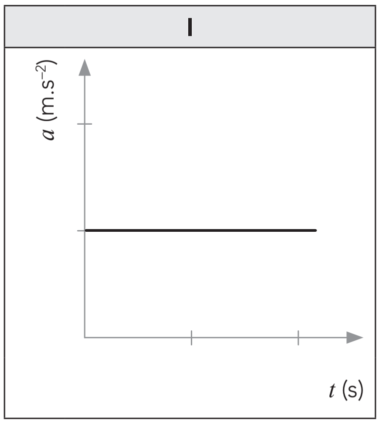
**G**



**H**



**I**



## 13. Worksheet 7

Solve the following problems using the **kinematic equations**:

1. An aeroplane accelerates down a runway at 3,20 m/$s^2$ for 32,8 s until it finally lifts off the ground.
   Calculate the distance travelled before take-off.

   ______________________________

2. A car starts from rest and accelerates uniformly over a time of 5,21 seconds for a distance of 110 m.
   Determine the acceleration of the car.

   ______________________________

3. A race car accelerates uniformly from 18,5 m/s to 46,1 m/s in 2,47 seconds.
   Calculate the acceleration of the car and the distance travelled.

   ______________________________

4. A rocket is accelerated to a speed of 444 m/s in 1,83 seconds.
   What is the acceleration and what is the distance that the rocket travels?

   ______________________________

5. A bike accelerates uniformly from rest to a speed of 7,10 m/s over a distance of 35,4 m.
   Find the acceleration of the bike.

   ______________________________

6. A car traveling at 22,4 m/s skids to a stop in 2,55 seconds.
   Determine the skidding distance of the car (assume uniform acceleration).

   ______________________________

7. A buck is capable of jumping to a height of 2,62 m.
   What is the take-off speed of the buck?

   ______________________________

## 14. Answers for Worksheet 7

1. The distance travelled before take-off is 1 720 m

2. $a = 8{,}10$ m/s$^2$

3. $a = 11{,}2$ m/s/s and $d = 79{,}8$ m

4. $a = 243$ m/s/s and $d = 406$ m

5. $a = 0{,}712$ m/s/s

6. $d = 28{,}6$ m

7. $v_i = 7{,}17$ m/s

## 15. Worksheet 8

Construct **graphs** and use **kinematic equations** as instructed below:

1. Nompumelelo is driving through town at 25,0 m/s and begins to accelerate at a constant rate of –1,0 m/s$^2$. Eventually she comes to a complete stop.
    - 1.1 Represent Nompumelelo's accelerated motion by sketching a velocity–time graph. Use the graph to determine this distance.
    - 1.2 Use kinematic equations to calculate the distance that Nompumelelo travels while decelerating.

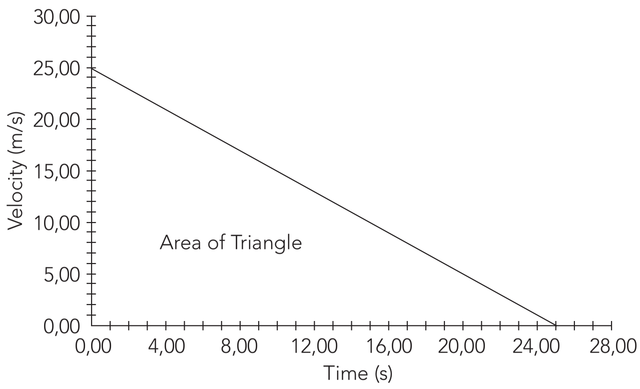
2. Malachi is driving his car at 25,0 m/s. He accelerates at 2,0 m/s$^2$ for 5 seconds.

    He then maintains a constant velocity for 10,0 additional seconds.
    - 2.1 Represent the 15 seconds of Malachi's motion by sketching a velocity–time graph. Use the graph to determine the distance that he travelled during the entire 15 seconds.
    - 2.2 Break the motion into its two segments and use kinematic equations to calculate the total distance travelled during the entire 15 seconds.

3. Johnny travels at 30,0 m/s for 10,0 seconds. He then accelerates at 3,00 m/s$^2$ for 5,00 seconds.
    - 3.1 Construct a velocity–time graph for Johnny's motion. Use the graph to determine the total distance travelled.
    - 3.2 Divide Johnny's motion into the two time segments and use kinematic equations to calculate the total displacement.

# 16. Answers for Worksheet 8

1 1.1 The velocity–time graph for the motion is:



The distance travelled can be found by a calculation of the area between the line on the graph and the time axis.

Area = $0,5 \times b \times h = 0,5 \times (25,0\ \text{s}) \times (25,0\ \text{m/s})$
Area = 313 m

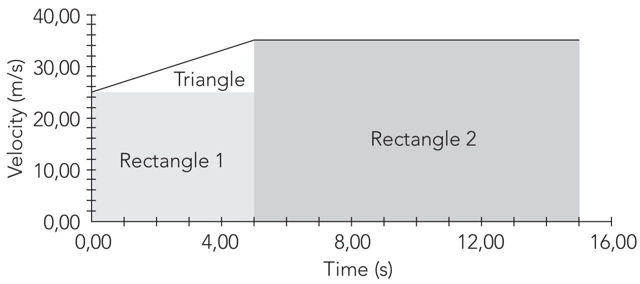
1.2 The distance travelled can be calculated using a kinematic equation. The solution is shown here.

| Given: | | | Find: |
|---|---|---|---|
| $v_i = 25,0$ m/s | $v_f = 0,0$ m/s | $a = –1,0$ m/s$^2$ | $d = ??$ |

$v_f^2 = v_i^2 + 2 \times a \times d$
$(0\ \text{m/s})^2 = (25,0\ \text{m/s})^2 + 2 \times (–1,0\ \text{m/s}^2) \times d$
$0,0\ \text{m}^2/\text{s}^2 = 625,0\ \text{m}^2/\text{s}^2 + (–2,0\ \text{m/s}^2) \times d$
$0,0\ \text{m}^2/\text{s}^2 – 625,0\ \text{m}^2/\text{s}^2 = (–2,0\ \text{m/s}^2) \times d$
$(–625,0\ \text{m}^2/\text{s}^2)/(–2,0\ \text{m/s}^2) = d$

$d = 313$ m

2. 2.1 The velocity–time graph for the motion is:



The distance travelled can be found by a calculation of the area between the line on the graph and the time axis. This area would be the area of the triangle plus the area of Rectangle 1 plus the area of Rectangle 2.

Area = $0,5 \times b_{tri} \times h_{tri} + b_{rect1} \times h_{rect1} + b_{rect2} \times h_{rect2}$
Area = $(0,5 \times 5,0\ \text{s} \times 10,0\ \text{m/s}) + (5,0\ \text{s} \times 25,0\ \text{m/s}) + (10,0\ \text{s} \times 35,0\ \text{m/s})$
Area = 25 m + 125 m + 350 m
Area = 500 m

2.2 The distance travelled can be calculated using a kinematic equation. The solution is shown here.

First find the $d$ for the first 5 seconds:

| Given: | | | Find: |
|---|---|---|---|
| $v_i = 25,0$ m/s | $t = 5,0$ s | $a = 2,0$ m/s$^2$ | $d = ??$ |

$d = v_i \times t + 0,5 \times a \times t^2$
$d = (25,0\ \text{m/s} \times 5,0\ \text{s}) + (0,5 \times 2,0\ \text{m/s}^2 \times (5,0\ \text{s})^2)$
$d = 125\ \text{m} + 25,0\ \text{m}$
$d = 150$ m

Now find the $d$ for the last 10 seconds:

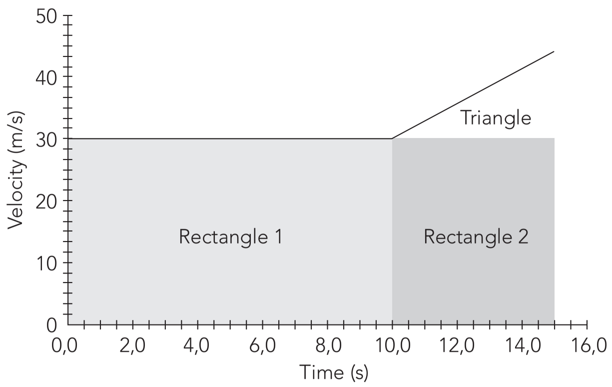
| Given: | | | Find: |
|---|---|---|---|
| $v_i = 35{,}0$ m/s | $t = 10{,}0$ s | $a = 0{,}0$ m/s$^2$ | $d = ??$ |

Note: The velocity at the 5 second mark can be found from knowing that the car accelerates from 25,0 m/s at +2,0 m/s$^2$ for 5 seconds, This results in a velocity change of $a \times t = 10$ m/s, and thus a velocity of 35,0 m/s.

$d = v_i \times t + 0{,}5 \times a \times t^2$
$d = (35{,}0 \text{ m/s} \times 10{,}0 \text{ s}) + (0{,}5 \times 0{,}0 \text{ m/s}^2 \times (10{,}0 \text{ s})^2)$
$d = 350 \text{ m} + 0 \text{ m}$
$d = 350 \text{ m}$

The total distance for the 15 seconds of motion is the sum of these two distance calculations:
distance = 150 m + 350 m = 500 m

3. 3.1 The velocity–time graph for the motion is:



The distance travelled can be found by a calculation of the area between the line on the graph and the time axis. This area would be the area of the triangle plus the area of Rectangle 1 plus the area of Rectangle 2.

Area = $0{,}5 \times b_{tri} \times h_{tri} + b_1 \times h_1 + b_2 \times h_2$
Area = $0{,}5 \times (5{,}0 \text{ s}) \times (15{,}0 \text{ m/s}) + (10{,}0 \text{ s}) \times (30{,}0 \text{ m/s}) + (5{,}0 \text{ s}) \times (30{,}0 \text{ m/s})$
Area = 37,5 m + 300 m + 150 m
Area = 488 m

3.2 The distance travelled can be calculated using a kinematic equation.

First find the displacement ($d$) for the first 10 seconds:

| Given: | | | Find: |
|---|---|---|---|
| $v_i = 30{,}0$ m/s | $t = 10{,}0$ s | $a = 0{,}0$ m/s$^2$ | $d = ??$ |

$d = v_i \times t + 0{,}5 \times a \times t^2$
$d = (30{,}0 \text{ m/s} \times 10{,}0 \text{ s}) + (0{,}5 \times 0{,}0 \text{ m/s}^2 \times (10{,}0 \text{ s})^2)$
$d = 300 \text{ m} + 0 \text{ m}$
$d = 300 \text{ m}$

Now find the displacement for the last 5 seconds:

| Given: | | | Find: |
|---|---|---|---|
| $v_i = 30{,}0$ m/s | $t = 5{,}0$ s | $a = 3{,}0$ m/s$^2$ | $d = ??$ |

$d = v_i \times t + 0{,}5 \times a \times t^2$
$d = (30{,}0 \text{ m/s} \times 5{,}0 \text{ s}) + (0{,}5 \times 3{,}0 \text{ m/s}^2 \times (5{,}0 \text{ s})_2)$
$d = 150 \text{ m} + 37{,}5 \text{ m}$
$d = 187{,}5 \text{ m}$

The total displacement for the 15 seconds of motion is the sum of these two displacement calculations:
distance = 300 m + 187,5 m = 487,5 m