

GRADE 10

EXTRACT FROM DRAFT PLANNER

Mathematics

Teacher Toolkit:
CAPS Planner

TERMS 1 & 2

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A. INTRODUCTION

This book is intended to help you cover the curriculum for Grade 10 Mathematics in Terms 1 and 2. There is a companion book for Terms 3 and 4. Teachers should keep these books to use from year to year.

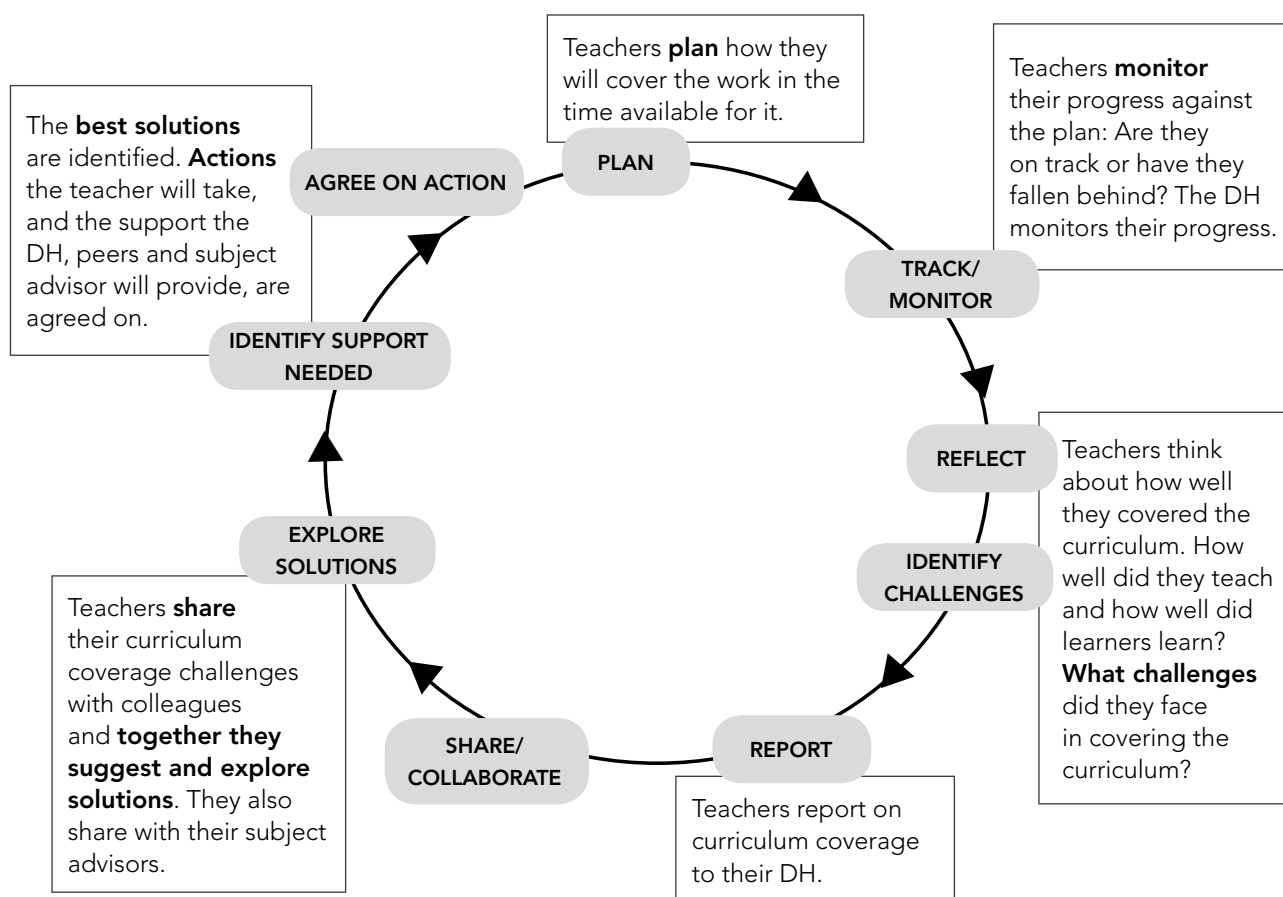
1. The need to improve curriculum coverage

In South Africa, too many learners drop out of school before Grade 12, and too few of those who reach Grade 12 do well in the NSC examinations. There are many reasons for such poor outcomes. One of the most important of these is that the curriculum is not covered each year. In other words, the teachers do not teach everything required by the CAPS in the year, and learners do not sufficiently understand the concepts and develop the skills that are taught. **Improving curriculum coverage is the key thing that teachers can do to improve learning outcomes.**

2. A cycle of activities that support improved curriculum coverage

Covering the curriculum is a complex task in which teachers face many challenges. However, there is a cycle of practices that can support curriculum coverage (see Figure 1). If these practices become routine in the school, curriculum coverage, and thus learners' outcomes, should improve.

Figure 1: The cycle of practices for supporting improved curriculum coverage



B. INFORMATION ABOUT RESOURCES IN THIS BOOK

In this book, you will find resources which will help you plan, track, reflect and report on curriculum coverage for the purpose of working collaboratively with peers and your department head (DH) and subject adviser to solve curriculum coverage problems. The resources are described below.

1. Planners for a daily programme of work

Later in this book there are planners that will help you plan what to teach each day in Term 1 and Term 2 (see Resources 1 and 2 in Section C). These planners provide a daily programme of work. There is a planner for all the books on the approved list of Learning and Teaching Support Materials (LTSMs) for Grade 10 Mathematics.

1.1 How planners link to the CAPS

Planners link the CAPS contents and skills to activities in the learner's book (LB) and teacher's guide (TG) of each set of LTSMs. The daily plan of activities ensures that time is allocated to all the work required by the CAPS in the term. Should you miss a lesson for any reason, it is important that you do not skip this lesson, but continue in the next lesson from where you left off.

Please note: The sequence of topics in the planners follows the order given in the provincial annual teaching plan (ATP) of the KwaZulu-Natal Department of Education, on which it is based. This might not be the same as the CAPS. If the ATP is different in the year in which you are using this planner, please follow the ATP but use the relevant parts of the planners to help you plan the work to be done in the LTSM you are using.

In the CAPS, four-and-a-half hours have been allocated to Mathematics in the FET Phase each week. To comply with this, the planners give the content and skills for five 55-minute lessons each week.

1.2 The structure of the planners

The example of a planner below (Table 1) is from Week 5 *Classroom Mathematics* Term 1. It shows you how the planning for a week is arranged. The same layout, abbreviations and symbols are used in the planners for all the LTSMs for each term.

The table heading states the week of the term and the LTSM to which the planning is linked. Look at the notes to see what each column tells you.

Table 1: An example of a planner

CLASSROOM MATHEMATICS Week 5 # Supplement						
Lesson	CAPS concepts and skills	LB pp.	LB ex.	TG pp.	Siyavula Everything Maths	
					LB pp.	TG pp.
19	Formal assessment: Investigation or project to be marked and returned by Lesson 27					
20	Exponents: CAPS p. 21 Revise laws of exponents learnt in Grade 9 where $x, y > 0$ and $m, n \in \mathbb{Z}$ [Exponential notation, not laws] Learners should expand expressions to get their answers	39 43	2.1 (no. 1c–f, 2c–f) 2.2 (no. 1e, g–i) 2.3 (no. 2l–o, s, t)	63	81 Ex. 3–1 (no. 1–11)	35 85
21	Revise laws of exponents learnt in Grade 9 where $x, y > 0$ and $m, n \in \mathbb{Z}$ [Marking and consolidation]		As above		As above	
22	Revise laws of exponents learnt in Grade 9 [Revisit the laws and definitions, extend to $m, n \in \mathbb{Q}$] See Resource 4 in Section C of this planner	46 Also see Resource 4	2.4 (no. 1aa, bb, cc, dd)#	74	87 Ex. 3–2 (no. 1–5)	86
23	Consolidation					

The columns, from left to right, give the following information:

- The number of the lesson in the term.
- The CAPS content and skills that are dealt with in each lesson, and the page in the CAPS where each topic or subtopic starts.
- The page number in the learner's book where content and work for learners can be found.
- The activity in the learner's book that should be done by the learners during the lesson.
- The page number in the teacher's guide where support is given for the work to be done.
- The page number in the *Siyavula Everything Maths* learner's book where there are activities related to the content. These are resources which you can use for teaching, revision, extension or consolidation, in class or for homework.
- The page number in the *Siyavula Everything Maths* teacher's guide where there is information to support the material in the learner's book.

Abbreviations and symbols used in the planners
<ul style="list-style-type: none">• TG = teacher's guide• LB = learner's book
* = select (this indicates that teachers should choose some of the questions given in the activity referred to) # = supplement (this indicates that the activity/exercise referred to is insufficient, and teachers should provide additional examples)

1.3 How to use the planners

Plan for the term

- **Find the correct planner to use** – the one that gives the daily plans for the LTSM that you use mostly in your class. You can of course use the others to help you find additional or alternative activities related to the same skills and concepts.
- **Check the length of the term against the number of weeks in the planner.** The planners for **Term 1** are based on a first term of 48 days, organised into one week of three lessons, and nine weeks of five lessons each. There are thus 48 lessons of 55 minutes in each planner. The CAPS states that Term 1's work should be completed in 11 weeks and so the content has been organised to accommodate the shorter time available. **Term 2** has plans for a term that is also ten weeks long with a slightly shorter first week and the final two weeks allocated to revision and the mid-year examination.

The planners remain the same from year to year, but the school calendar does not. If the term in any year is of a different length, or if your school allocates more or less time for end-of-term tests and examinations than is in the planner, you will have to adjust your planning accordingly. It is very important to do this planning at the beginning of the term so that you neither rush through the work when you in fact have more time for it than allocated in the planner, nor find that you have followed the pace of the planner, but run out of teaching time.

Plan for lessons

- **Compare your timetable with the number of lessons in the week, and the length of each lesson.** In the planners, there are five lessons of 55 minutes each per week. If you do not have five periods of this length each week, you will need to adjust the programme for each lesson in the planner to fit the length and number of your lessons.
- **Plan and prepare for each lesson.** The planners give support for the planning of a programme of work. They do not offer help with detailed lesson planning or preparation.

Planning for a lesson involves drawing up a plan of action. A lesson plan should include an introduction, sequenced content and activities for learners to work on individually or in groups, a conclusion, and homework activities to consolidate the learning of the day or to prepare for the next day's lesson where possible. No lesson plan templates are provided here. You should use the one you prefer or that is specified by your school/subject adviser.

When preparing for a Mathematics lesson you should:

- make sure that you understand every aspect of the content knowledge and skills addressed in the lesson;
- consider relevant prior knowledge that the new work builds on, how you will check that learners have this knowledge, and how you will help close any gaps from the past;
- think carefully about how best to help learners understand new work and develop new skills;
- work through each of the learner activities yourself, noting alternative answers where necessary, and making notes on possible learner difficulties in relation to the activities;
- ensure that any resources you need to use in the lesson are available;
- decide how you will pair/group your learners;
- check in your teacher's guide and learner's book for enrichment/challenge activities for learners who have completed their work and/or need a challenge; and
- see where there are remedial and support activities for learners who have barriers to learning.

These brief points are elaborated on in Resource 3 in Section C.

2. Plans for assessment

Curriculum coverage requires teachers to teach the content given in the CAPS each term/year. It also requires that learners understand the concepts and develop the skills that are taught. Thus, assessment gives vital information about how well the curriculum is being covered. It tells teachers which topics or aspects of topics learners are struggling with, and how many learners are managing well, just coping, or struggling. Teachers need to reflect on possible reasons for and implications of these patterns of achievement, thinking about, for example, what they tell of the efficacy of their teaching methodology and how it could be improved, what feedback they can give learners to encourage and support improvement, and whether they can move on to new work, or need to remediate that which has already been taught.

The CAPS requires that teachers assess their learners' progress by means of both informal and formal assessment, and resources in this book assist teachers with planning for both.

2.1 Informal assessment

Informal assessment is ongoing and part of the teaching process as teachers listen to learners' responses and questions in class, and check their classwork and homework books. No record of the marks for informal assessment needs to be kept, but recording some of these will help you monitor learners' progress.

The CAPS for Mathematics in the FET Phase does not specify exactly what needs to be done for informal assessment, and consequently the planners do not schedule informal assessment activities. Teachers should use their discretion in this regard. All the LTSMs include activities that are either intended to be used for informal assessment, or which could effectively serve this purpose. You should think about which to use when you do your planning. Occasionally suggestions are made in the planners.

2.2 Formal assessment

Formal assessment is assessment for which marks are recorded. In South African schools, these marks should be entered into SA-SAMS.

The resources in this book help you plan when your learners will complete formal assessment tasks. Knowing this helps you to plan related activities such as when tasks and marking guidelines will be moderated, when marking will be completed and moderated, when marks will be recorded, and when feedback will be given to learners. All these activities are important in ensuring that assessment is at the correct level and that information from it can be used to support improved curriculum coverage.

Formal assessment tasks specified in the CAPS

The CAPS specifies two formal assessment tasks for Term 1 (a project/investigation and a test) and two for Term 2 (an assignment or test and an examination).¹

Formal assessment programmes in the LTSMs and planners

Resource 7 in Section C shows how the formal assessment tasks are integrated into the planners for Terms 1 and 2 respectively. They show when tasks are scheduled in the planner for each of the LTSMs. A note is also made of this date in the planners themselves by writing **Formal assessment** in the CAPS content column. You will see an example of this in Table 1, Lesson 19. Where more than one assignment, project or investigation has been provided in the LTSM, the planner shows a suggested date for one of these. You are of course free to give another of these tasks to your learners at the appropriate time or to give them both, recording the marks of only one for formal assessment purposes. Note that, for Term 2, the option to write a test has been programmed in the planners. Should you wish your learners to do an assignment instead of a test, you will need to use one or more of the periods in which no new work is scheduled for this purpose, or use time allocated to the test.

Not all the LTSMs provide an example of all the assessment activities required for the assessment tasks, and some of those provided might not be suitable for your class. Some provide an exemplar test or examination in the learner's book, making it unsuitable for use as a formal assessment task as learners can prepare for it in advance. It is therefore essential that you check the assessment activities carefully before giving them to the learners and, if necessary, adapt them, set your own, use examples from a different set of LTSMs or, in the case of the Term 1 test and the mid-year examination, use one provided by the district/province or in Section C of this book. If you use centrally set common tests, the resources in the LTSMs and in this book can be used for practice.

¹ The DBE makes changes to the assessment requirements from time to time. In such instances, you might need to change the assessment programme shown here to align with the revised requirements.

The dates in the assessment programme provided for your LTSM might not suit your context for some reason. You should be sure to check this, and schedule dates that are more appropriate where necessary.

3. Resources to support content knowledge, pedagogy and assessment practices

Sound content and pedagogical knowledge and teaching and learning resources enable teachers to support learning, and thus have a positive impact on curriculum coverage. For this reason, where appropriate, guidelines for teaching certain topics or skills, explanatory information about the content, suggestions for sound structuring of lessons and exemplar assessment tasks are provided in this series of books. Below is a brief description of resources provided in the Resources section of this book.

3.1 Guidelines for preparing and presenting a Mathematics lesson

Section 1.3 above drew attention to the need for thorough preparation for a Mathematics lesson to be successful, and gave some brief pointers to effective preparation. Resource 3 in Section C gives more detail about the points made in 1.3, as well as suggestions for how to structure the main activities in a lesson. Following this format in most lessons will ensure that time is allocated to both the learning of new concepts and skills and opportunities for practising and consolidating these.

Note that the times suggested in Resource 3 in Section C are for a lesson of about one hour. You will need to make appropriate adjustments if you have lessons of a different length.

3.2 Supplementary information for Term 1

Resources 4 and 5 both offer additional ideas to those in the LTSMs for handling a particular concept in Term 1.

Resource 6 provides a description of where in each LTSM teachers can find activities for remediation and extension of the Term 1 topics.

It is hoped that these resources will help teachers to better support their learners and so contribute to improved curriculum coverage.

3.3 An exemplar Term 1 test, memorandum and analysis of cognitive levels

An exemplar Term 1 test is provided in Resource 8, with a marking memorandum together with an analysis of cognitive levels in Resource 9. Resource 10 shows the weighting of marks in the test across the cognitive levels compared with the weighting specified in the CAPS (p. 53).

3.4 Exemplar Term 2 tests, memorandums and analyses of cognitive levels

It is probable that learners will write a provincially set common mid-year examination. For this reason, we have provided a choice of two tests instead of a mid-year examination exemplar. Resource 11 is an Euclidean geometry test and Resource 14 an algebraic functions test. The tests have marking memorandums and an analyses according to the weightings of cognitive levels specified in the CAPS (see Resources 12, 13, 15 and 16.)

These tests provide alternatives for you to use instead of those in the LTSMs. The CAPS requires only one test, so you can choose one of those provided for formal assessment and use the other for informal assessment; or you could use both for informal assessment and set your learners an assignment instead.

If a common mid-year examination is not provided, you could use the end-of-term test from Term 1 and the two Term 2 tests as a basis for setting your own mid-year examination.

Assessment resources described in 3.3 and 3.4 above support curriculum coverage by:

- providing assessment tasks that are fully CAPS compliant, and which have been approved by district advisers (this ensures that learners will be assessed at the correct standard);
- providing correct marking guidelines so that learners' work will be marked to the same standard across different markers; and
- supporting teachers' ability to work with the levels of questions required by the CAPS by providing a detailed analysis of the levels of questions asked in the tasks (this strengthens their ability to set assessment tasks that comply with the weighting of cognitive levels themselves in future).

You can photocopy and use the exemplar test and examination paper as they are for formal or informal assessment, or adapt them in ways that make them more useful to you.

3.5 Exemplar formal assessment mark record sheets

Resource 17 provides templates on which to record formal assessment marks for Term 1 and Term 2 to help you see how individual learners are progressing, and which topics might need remedial work. Should you wish, you could also record any informal assessment marks that you have to give a fuller picture.

3.6 A template for tracking, reflecting and reporting for collaborative problem solving

Planning is one activity on the curriculum support cycle (Figure 1), and you have seen how the material in this book supports teachers with planning. The templates provided as Resource 18 in Section C are tools to assist teachers with other aspects of the cycle. There is a template to use in conventional schools, and one for use in multigrade schools. The template for conventional schools is reproduced below, with annotations that show how it is used as a tool for curriculum coverage support. The template for multigrade schools works in the same way.

Teachers should print a copy of the relevant template for each week of the term and use it together with the teaching plan for that week. This teaching plan could be the planner for their LTSM in this book or the ATP or another daily planning resource. They record curriculum coverage information and their reflection on it for all the Mathematics lessons with each class they teach in the week.

Note that dates are not given in the tracking and reflecting template. Teachers should fill two dates into the spaces at the top of the template. Firstly, they should record the week in the planner when the work they are doing is scheduled to be done; secondly, they should record the week when they in fact are starting that work. These dates will help them see how well they are keeping up with the pace set in the planner they are following.

This is the no. of the week in the planner that is being followed.

This is the no. of the week in the term when the work actually starts. If curriculum coverage is behind, this might be a later week than the week in the planner.

Week no. in planner _____

Week no. in term when work planned for week started _____

Refer to the planner for details of the week's work (or the ATP for subjects without planners)

Class (or subject for FP)				
----------------------------------	--	--	--	--

On track by end of week? (Yes/no) _____

How many learners are working confidently? (Rough estimate) _____

How many learners in this class? _____

At the end of the week, the teacher uses evidence from informal and formal assessment, to estimate for each class how many learners out of the total are working confidently at Level 4 or above. They use this information, together with the amount of work planned that they have taught, to state whether or not their curriculum coverage is on track.

DAY	BRIEF NOTES ON THE DAY'S WORK: Consider such things as: <i>What concepts/skills did the learners struggle with or manage well in this lesson? What could be the reasons for this? Did the class complete the work you had planned? Do you need to change your plans for the next lesson? What changes will you make?</i>
1	
2	
3	
4	
5	

Prompts for daily reflection.

Each day, the teacher reflects on how their lesson went, and how they could improve it using the prompts provided. They also think about whether or not they can proceed as planned in the next lesson. This is a professional judgement they make based on informal and formal assessment. They note the main points here.

Reflection on the week:

What concepts and skills for the week did learners struggle with?
What could you do differently next time to better support or extend learning?
What good practice could you share?

Did you cover the curriculum for the week? If not, what were some of the challenges? What can you do to catch up? What help do you need?
How will your progress this week affect your plan for next week?

At the end of the week, the teacher reflects on the week's teaching and learning. They think about what learners found difficult, and how they can change their practice so learning improves.

At the end of the week, the teacher considers whether or not the work planned for the week has been taught and learnt, and if not, what can be done to solve curriculum coverage problems and get back on track.

The teacher writes their reflections here for their own professional development, but also to share them with their DH to get support in solving problems.

DH: _____

Date: _____

At the end of the week, the DH reads the teacher's reflections and record of curriculum coverage and signs the template. S/he uses the information shared in a supportive conversation with the teacher. Together they consider any curriculum coverage problems the teacher faces and work towards finding solutions.

C. RESOURCES

1. PLANNERS FOR TERM 1


1.1 Classroom Mathematics

CLASSROOM MATHEMATICS Week 1						
* Select						
Lesson	CAPS concepts and skills	LB pp.	LB ex.	TG pp.	Siyavula Everything Maths	
					LB pp.	TG pp.
1	Setting parameters with your class and doing diagnostic testing					
2	Algebraic Expressions: CAPS p. 21 Understand that real numbers can be rational or irrational	1	1.1 (no. 1, 4, 5)	20	2 Ex. 1–1 (no. 1–3)	13–16 35 41
3	Understand that real numbers can be rational or irrational [Recurring decimals to $\frac{a}{b}$]	3	1.1 (no. 6, 7, 9)	21	5 Ex. 1–1 (no. 4*, 5*, 6*, 7a–c)	41

CLASSROOM MATHEMATICS Week 2						
# Supplement; * Select						
Lesson	CAPS concepts and skills	LB pp.	LB ex.	TG pp.	Siyavula Everything Maths	
					LB pp.	TG pp.
4	Establish between which two integers a given simple surd lies	5	1.1 (no. 10a–c)	22	11 Ex. 1–3 (no. 1–4)	44
	Round real numbers to an appropriate degree of accuracy	#	#	#	9 Ex. 1–2 (no. 1–6)	43
5	Multiply a binomial by a trinomial [Revision of Grade 9 products]	6	1.2–1.5*	23	14 Ex. 1–4 (no. 1–14)*	44
	Multiply a binomial by a trinomial	11	1.6 (no. 1–3)	26	16 Ex. 1–4 (no. 15–24)*	44
6	Multiply a binomial by a trinomial [Sum and difference of 2 cubes]	12	1.7 (no. 1a, b, i, j, 2a–d)	28	28	–
7	Consolidation					
8	Factorise by taking out common factors	14	1.9* 1.10*	32	18 Ex. 1–5 (no. 1–9, 11–18, 20–22)*	46
	Factorise the difference of 2 squares	19	1.13 (no. 1a–z)*	34	19 Ex. 1–5 (no. 10, 19, 23)	46

2. PLANNERS FOR TERM 2

2.1 Classroom Mathematics

CLASSROOM MATHEMATICS Week 1						
		*Select	#Supplement			
Lesson	CAPS concepts and skills	LB pp.	LB ex.	TG pp.	Siyavula Everything Maths	
					LB ex.	TG pp.
1	Euclidean Geometry: CAPS p. 25 1. Revise basic results established in earlier grades regarding lines, angles and triangles, especially the similarity and congruence of triangles Note: Refer to the most recent Mathematics Examination Guidelines Grade 12 Acceptable Reasons: Euclidean Geometry; Revise intersecting and parallel lines	195–198	9.1 (no. 1–4)	252	pp. 349–356 Note: pp. 350, 352 in the Examples column: The letters should be <i>a, b, c</i> , etc. without caps  p. 353 Example 1: Write alt \angle s ($AB \parallel CD$) and co-int \angle s ($AB \parallel CD$) 11–1 (no. 1–5) p. 354	37 185
2	Euclidean Geometry: CAPS p. 25 Revise triangles: Types, interior and exterior angles, Theorem of Pythagoras	202–207	9.3 (no. 1a, b, c, f, g, 7–9)*	254	pp. 356–359, 362–365 Investigations: pp. 358–359 Example 2 p. 362 11–2 (no. 1a–c, e, g) p. 363	– 189
3	Consolidation					
4	Revise congruent and similar polygons and triangles; See <i>Platinum Mathematics</i> LB p. 167 for how to prove <i>s</i> are similar	199–206#	9.2 (no. 2, 3) 9.3 (no. 1d, e, 2, If triangles are congruent, write up a proof, 4–6)	253	pp. 359–361, 363–365 11–2 (no. 1d, f, First prove Δ s are similar, 2a–e, If triangles are congruent, write up a proof) p. 363	189 Note: 2e should be \equiv

3. Guidelines for preparing a Mathematics lesson

The planner provides a detailed programme to guide you through the daily content you need to teach your class, and when to do formal assessments. You are still required to draw up your own lesson plans and will still make the final professional choices about which examples and explanations to give, which activities to set for your class and how to manage your class on a daily basis. It is a good idea that you and your Mathematics colleagues agree on a day that you can get together to plan your lessons as a group and submit your plans to your HOD for quality assurance. To deliver the lessons successfully **you must do the necessary preparation yourself**. Bear in mind that your lessons will not succeed if you have not prepared properly for them. This entails a number of key steps, such as those noted below.

- 1. Review the term focus:** Start by looking at the CAPS and **orientating** yourself to the CAPS content focus for the year and the term. It is important that you are clear about the content focus, as this will frame everything you do in your Mathematics lessons during the term. **The time allocation per term** is given in the CAPS document on page 17. This indicates how many hours are to be spent on each topic. Note that where the term length is different to the total number of weeks specified in the CAPS, you will have to adjust the pace at which you work on each topic.
- 2. Prepare resources:** It is very important that you **check what is required for each lesson ahead of time** so that you have all your resources available and ready for use.
- 3. Prepare the content:** Think carefully about what it is that you will teach your learners in each lesson. Think about the prior knowledge of the content that learners should have learned in earlier grades that will be built on in the lesson. You should refer to the CAPS content and skills clarification column for further guidance while you prepare. In addition, in Term 1, before teaching Exponents refer to Resource 4 and before teaching Numbers and Patterns, refer to Resource 5 – both are in Section C of this planner.
 - Prepare **a short introduction** to the topic so that you can explain it in simple terms to your learners. The Learner's Book and Teacher's Guide will assist you. Also think about how learners will develop an understanding of the main concepts of the lesson topic. You need to think about how to explain new Mathematics content and skills to your learners.
 - **Make sure you have prepared for teaching concepts before you teach.** Prepare yourself to assist learners with any questions they might have during the lesson. Look at the activities in the Learner's Book and in the *Siyavula Everything Maths* Learner's Book and think about how best to help your learners engage with them. Consider what will be done in class and at home. Be sure to have some extension and remediation activities ready to use as needed. See Resource 6 in Section C of this document: *Remediation and extension support provided in the LTSMs*. It is a good idea to do your own answers to the exercises/activities you will be giving your learners so that you are aware of where learners may have difficulties. Also identify any common misconceptions and plan how you will address these.

Consider the needs of any learners with barriers to learning in your class and how best you can support them. The DBE has published some excellent materials to support you in working with learners with learning barriers.

- 4. Plan the steps in your lesson, and think carefully about how much time to allocate to different learner activities.** Also think about how to organise the learners when they work. Most lessons should include the steps below and we have suggested the time to be spent on each (for a 55 minute lesson) – but you might find that you need to work differently in some lessons, such as when a test is being written.
 - **Homework review/reflection (10 minutes):** This is the first activity of the lesson. During this part of the lesson you may reflect on the previous day's work. We recommend that you use these 10 minutes to remediate and correct the previous day's homework and do spot testing. Learners should have marked their work from the answers provided at the back of their Learner's Book. Choose one or two activities that you noted were problematic, to go over more thoroughly. Allow learners the opportunity to write corrections as needed. If peer or individual marking has been done, you should regularly sample some learners' books to moderate this marking and to see what errors are being made so you can remediate these.
 - **Lesson content – introduction and concept development (10 minutes):** This is the second activity of the lesson. We recommend that you are actively involved with your class for 10 minutes – going through examples interactively with your learners or assisting them with introductory investigations. There are worked examples, suggested explanations and introductory investigations in the Learner's Book or Teacher's Guide that you should go through with your class as a whole. The CAPS content clarification column would also be a useful reference should you need further examples or ideas to enrich your explanations. You should elaborate on these explanations and provide additional examples if necessary.
 - **Classwork activity (30 minutes):** This is the third activity of the lesson. This part of the lesson provides an opportunity for learners to consolidate new concepts by doing activities or exercises from the Learner's Book or the *Siyavula Everything Maths* Learner's Book. These activities allow learners to practise their mathematical and problem solving skills. It is important that you **prepare yourself for the classwork activity** because you

need to assist learners as they do the classwork. You may also need to select particular questions from each activity for the classwork in advance. This will ensure that all activity types and concepts are covered each day and enable you to give quick and clear instructions to your learners about which exercise they should do, which is necessary as the **exercises given in the various Learner's Books vary greatly in length**.

Depending on your learners and the activities, you could discuss one or two of the classwork activities with the whole class before allowing the learners to work independently. Give the learners an opportunity to complete these activities alone, in pairs, and in groups, so that they experience working alone as well as with their peers. Encourage learners, where appropriate, to write the questions with their answers and to show their working neatly and systematically in their workbooks. Plan the timing of the lesson so that you and the learners can go over some of the classwork together and they can do corrections in the lesson.

If you require your learners to work in groups, carefully assign learners in such a way that there are learners with mixed abilities who can assist each other in each group.

This is also the part of the lesson where you can assist learners who need extra support and extend those who need enrichment. Throughout the lesson, try to identify learners who need additional support or extension by paying attention to how well they managed the homework, how they respond when you develop the new content, and how they cope with the class activities. While the rest of the class is busy working through the classwork activities, you should spend some time with those that need extra support and help them to work through the remediation activities. If learners successfully complete the daily classwork activities ahead of the rest of the class, be prepared to give them extension activities to do. All the LTSMs provide activities and ideas for remediation and extension. A table summarising what each set of LTSMs offers for each topic is provided in Section C to help you access these resources in the LTSM you are using with your class, and in others you might have available.

- **Allocate homework (5 minutes):** This is the fourth and final activity of the lesson. In this step you should tell the learners about the homework for the day and make sure they know what is expected of them and understand what it is that they have to do. It is a good idea to get learners into the habit of regular daily homework such as completing unfinished classwork, revising what was done in class and noting what they did not understand. Once they have done this they should complete any additional work that you have set them to do for homework, such as specific questions that you have chosen from the classwork to be done as homework, or some of the remediation or extension activities given in the LTSMs you are using.

Homework enables the learners to consolidate the Mathematics that you have taught them in class. It also promotes learner writing, development of mathematical knowledge and language and the development of regular study habits. Encourage your learners to show their parent(s) or their guardian(s) the work they have done.

5. **After each lesson, reflect on how it went:** The tracking template has prompts to assist you, and spaces where you can note your thoughts about your lessons. You will use these notes as you plan and prepare for your teaching and in discussions with your department head and peers.

4. Expanding exponential expressions to explain the exponential laws and definitions where $m, n \in \mathbb{Q}$ (Term 1)

$x^n = x.x.x.x \dots \dots n$ times where $x > 0$ and $n \in \mathbb{Q}$

	Theory	By expanding	By using law/definition
1.	$x^{-n} = \frac{1}{x^n}$ AND $\frac{1}{8^1} = x^{-n}$ where $x \neq 0$	$\frac{p^3}{p^5} = \frac{p.p.p}{p.p.p.p.p} = \frac{1}{p^2}$ Since $\frac{p^3}{p^5} = \frac{1}{p^2}$ and $\frac{p^3}{p^5} = p^{-2}$ we can say $\frac{1}{p^2} = p^{-2}$ or $p^{-2} = \frac{1}{p^2}$	$\frac{p^3}{p^5} = p^{3-5} = p^{-2}$
2.	$x^n \times x^m = x^{(n+m)}$ AND $x^{(n+m)} = x^n \times x^m$ where $x > 0$ and $m, n \in \mathbb{Q}$	$x^3 \times x^2 = x.x.x \times x = x^5$ $p^{-3} \times p^{-2} = \frac{1}{p.p.p} \times \frac{1}{p.p}$ $= \frac{1}{p^5}$	$x^3 \times x^2 = x^{(3+2)} = x^5$ $p^{-3} \times p^{-2} = p^{-3-2}$ $= p^{-5}$ $= \frac{1}{p^5}$
3.	$\frac{x^n}{x^m} = x^{n-m}$ AND $x^{n-m} = \frac{x^n}{x^m}$ where $x > 0$ and $m, n \in \mathbb{Q}$	$\frac{d^5}{d^2} = \frac{d.d.d.d.d}{d.d.d.d.d} = d^3$	$\frac{d^5}{d^2} = d^{5-2} = d^3$ $\frac{c^{\frac{2}{3}}}{c^{\frac{1}{3}}} = c^{\frac{2}{3}-\frac{1}{3}} = c^{\frac{1}{3}}$
4	$(x^m)^n = x^{mn}$ AND $x^{mn} = (x^m)^n$ where $x > 0$ and $m, n \in \mathbb{Q}$	$(x^3)^2 = (x^3)(x^3) = x^{3+3} = x^6$ $b^{-3 \times 2} = b^{-3}.b^{-3} = (b^{-3})^2$	$(x^3)^2 = x^{3 \times 2} = x^6$ $b^{-3 \times 2} = (b^{-3})^2$
5.	$x^m \times y^m = (xy)^m$ AND $(xy)^m = x^m \times y^m$ where $x, y > 0$ and $m, n \in \mathbb{Q}$	$(7p^{\frac{1}{4}})^2 = 7p^{\frac{1}{4}} \times 7p^{\frac{1}{4}}$ $= 7 \times 7 \times p^{\frac{1}{4}} \times p^{\frac{1}{4}}$ $= 49p^{\frac{1}{2}}$	$7^2 \times (p^{\frac{1}{4}})^2 = 49p^{\frac{1}{4} \times \frac{2}{1}}$ $= 49p^{\frac{1}{2}}$
		Since $(7p^{\frac{1}{4}})^2 = 49p^{\frac{1}{2}}$ and $7^2 \times (p^{\frac{1}{4}})^2 = 49p^{\frac{1}{2}}$ we can say $(7p^{\frac{1}{4}})^2 = 7^2 \times (p^{\frac{1}{4}})^2$	
6.	$x^0 = 1$ where $x \neq 0$	$\frac{a^t}{a^t} = 1$ by cancelling Since $\frac{a^t}{a^t}$ give 1 and a^0 as answers, we can say $a^0 = 1$	$\frac{a^t}{a^t} = a^{t-t} = a^0$

Note: Simplify expressions and solve equations where $q\sqrt{x^p} = x^q$; $x > 0$; $q > 0$ are done in Grade 11 [See CAPS p. 30].

5. Introduction to linear patterns for Lesson 44 (Term 1)

Seeing a linear pattern

The LTSMs differ quite widely in their introduction to linear patterns. This introductory lesson starts with visual patterns. It aims to show how linear patterns form straight line graphs (if the points are joined) and to explain the formula $T_n = pn + q$ or $T_n = bn + c$ or $T_n = an + b$ as stated in the various LTSMs.

See the solutions for each LTSM below. Each starts with a reference to the LB and an activity drawn from this reference. Thereafter the following 6 items need to be done in this lesson:

1. Learners draw up a table of values.
2. Learners plot these points on a set of axes and note how the dots would form a straight line when joined.
3. Learners find the slope of the graph and extrapolate the line to find the approximate position of the y -intercept.
4. Learners find the equation of the straight line. [The general form of a straight line graph learnt in Grade 9 is $y = ax + q$ where: a is the slope of the line, and q is the y -intercept.]
5. Learners discuss why the independent variables form a linear pattern.
6. Introduce learners to the notation $T_n = pn + q$ or $T_n = bn + c$ or $T_n = an + b$ where
 - a) T stands for term.
 - b) n gives the term number.
 - c) T_n gives the position of the term.
 - d) The answer to $pn + q$ or $bn + c$ or $an + b$ gives the value of the term.
For example: In 2; 4; 6; 8;... the third term has a value of 6 and is written: $T_3 = 6$.
 - e) p or b or a in the above formulae give the common difference between the terms of a linear sequence.
 - f) $T_0 = q$ or $T_0 = c$ or $T_0 = b$ depending on the formula used.

NOTE: This introductory lesson paves the way to another of many methods to find the general term of a linear pattern algebraically.

For example: Calculate the general term for -4; -7; -10; -13; ...				
Solution: Find the common difference: $-7 - (-4) = -3$; $-10 - (-7) = -3$; $-13 - (-10) = -3$				
Multiples of -3	-3	-6	-9	-12
To get to original number	-1	-1	-1	-1
Original sequence	-4	-7	-10	-13
Since the common difference is -3, list the multiples of -3. Compare the new sequence to the original sequence. Work out what has to be added or subtracted to get back to the original sequence. One (1) needs to be subtracted from each term. $\therefore T_n = -3n - 1$				

Solutions for Classroom Mathematics

Do Exercise 3.2 No. 2a, b
LB p. 61. TG p. 112.

1.

Pattern No:	No. dots
1	4
2	7
3	10
4	13

4. Substitute $a = 3$ and any pair of numbers from the table for x and y .

$$y = ax + q$$

$$y = (3)x + q \quad [a = 3]$$

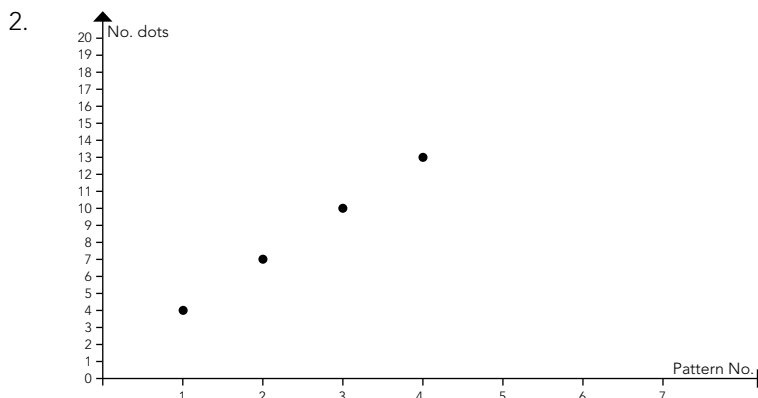
$$13 = (3)(4) + q \quad [\text{sub } (4; 13)]$$

$$13 = 12 + q$$

$$\therefore q = 1$$

So the equation of the line is

$$y = 3x + 1$$



Note how the dots would form a straight line when joined.

6. Slope is $\frac{3}{1}$; y -intercept is 1.

5. Look at the sequence 4; 7; 10; 13; Find the difference between consecutive terms: $7 - 4 = 3$; $10 - 7 = 3$; $13 - 10 = 3$. The difference is a constant value hence the sequence is linear.

6. In the sequence 4; 7; 10; 13; $T_1 = 4$; $T_2 = 7$; $T_3 = 10$ and so on. The common difference [3 in this case] is the value of p and $T_0 = 1$ is the value of q in $T_n = pn + q$.

Solutions for Mind Action Series

See Exercise 1 LB p. 58. No. 4. Refer to Diagrams 1 to 3.
Work out how many shaded squares there are in Diagram 4.

1.

Diagram No:	No. Shaded squares
1	3
2	6
3	9
4	12

4. Substitute $a = 3$ and any pair of numbers from the table for x and y .

$$y = ax + q$$

$$y = (3)x + q \quad [a = 3]$$

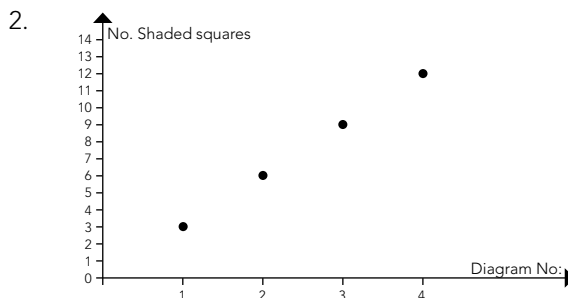
$$9 = (3)(3) + q \quad [\text{sub } (3; 9)]$$

$$9 = 9 + q$$

$$\therefore q = 0$$

So the equation of the line is

$$y = 3x$$



Note how the dots would form a straight line when joined.

6. Slope is $\frac{3}{1}$; y -intercept is 0.

5. Look at the sequence 3; 6; 9; 12; Find the difference between consecutive terms: $6 - 3 = 3$; $9 - 6 = 3$; $12 - 9 = 3$. The difference is a constant value hence the sequence is linear.

6. In the sequence 3; 6; 9; 12; $T_1 = 3$; $T_2 = 6$; $T_3 = 9$ and so on. The common difference [3 in this case] is the value of b and $T_0 = 0$ is the value of c in $T_n = bn + c$.

Solutions for Platinum Mathematics

See Worked Example LB p. 51. Refer to Figures 1 to 4.

Work out how many rods there are in each figure.

1.

Figure No:	No. rods
1	2
2	4
3	6
4	8

4. Substitute $a = 2$ and any pair of numbers from the table for x and y .

$$y = ax + q$$

$$y = (2)x + q \quad [a = 2]$$

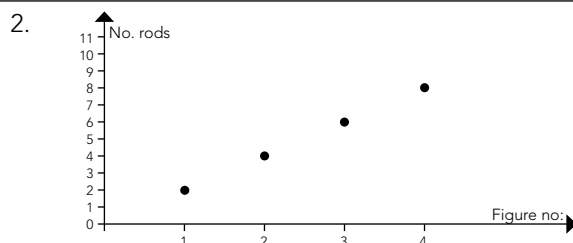
$$6 = (2)(3) + q \quad [\text{sub } (3; 6)]$$

$$6 = 6 + q$$

$$\therefore q = 0$$

So the equation of the line is

$$y = 2x$$



Note how the dots would form a straight line when joined.

6. Slope is $\frac{2}{1}$; y -intercept is 0.

5. Look at the sequence 2; 4; 6; 8; Find the difference between consecutive terms: $4 - 2 = 2$; $6 - 4 = 2$; $8 - 6 = 2$. The difference is a constant value hence the sequence is linear.

6. In the sequence 2; 4; 6; 8; $T_1 = 2$; $T_2 = 4$; $T_3 = 6$ and so on. The common difference [2 in this case] is the value of b and $T_0 = 0$ is the value of c in $T_n = bn + c$.

Solutions for Survival Series

LB p. 55 Ex, 6.1. 2g. Refer to the 3 figures containing hexagons.

Work out the perimeter of each figure.

1.

No. Hexagons:	Perimeter
1	6
2	10
3	14
4	18

4. Substitute $a = 4$ and any pair of numbers from the table for x and y .

$$y = ax + q$$

$$y = (4)x + q \quad [a = 4]$$

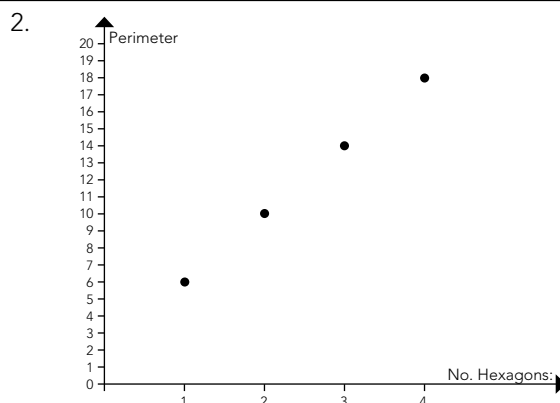
$$10 = (4)(2) + q \quad [\text{sub } (2; 10)]$$

$$10 = 8 + q$$

$$\therefore q = 3$$

So the equation of the line is

$$y = 4x + 2$$



Note how the dots would form a straight line when joined.

6. Slope is $\frac{4}{1}$; y -intercept is 2.

5. Look at the sequence 6; 10; 14; 18; Find the difference between consecutive terms: $10 - 6 = 4$; $14 - 10 = 4$; $18 - 14 = 4$. The difference is a constant value hence the sequence is linear.

6. In the sequence 6; 10; 14; 18; $T_1 = 6$; $T_2 = 10$; $T_3 = 14$ and so on. The common difference [4 in this case] is the value of a and $T_0 = 2$ is the value of b in $T_n = an + b$.

Solutions for Siyavula Everything Maths

LB p. 96. Refer to Figures 1 to 4.

Work out how many people are seated around each table.

1.

No. of tables:	No. people seated
1	4
2	6
3	8
4	10

4. Substitute $a = 2$ and any pair of numbers from the table for x and y .

$$y = ax + q$$

$$y = (2)x + q \quad [a = 2]$$

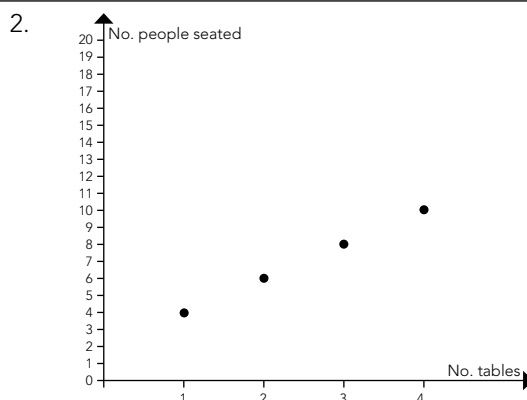
$$8 = (2)(3) + q \quad [\text{sub } (3; 8)]$$

$$8 = 6 + q$$

$$\therefore q = 2$$

So the equation of the line is

$$y = 2x + 2$$



Note how the dots would form a straight line when joined.

6. Slope is $\frac{2}{1}$; y -intercept is 2.

5. Look at the sequence 4; 6; 8; 10; Find the difference between consecutive terms: $6 - 4 = 2$; $8 - 6 = 2$; $10 - 8 = 2$. The difference is a constant value hence the sequence is linear.

6. In the sequence 4; 6; 8; 10; $T_1 = 4$; $T_2 = 6$; $T_3 = 8$ and so on. The common difference [2 in this case] is the value of b in $T_n = bn + c$.

NOTE: LB p. 100 gives the general term as $4 + 2(n - 1)$

This works out to be $2n + 2$ which relates to $y = 2x + 2$

6. Remediation and extension support provided in the LTSMs

LTSM	ALGEBRAIC EXPRESSIONS		EXPONENTS		NUMBERS AND PATTERNS		EQUATIONS AND INEQUALITIES	
	Remediation	Extension	Remediation	Extension	Remediation	Extension	Remediation	Extension
Classroom Mathematics Glossary: LB p. 478	LB p. 36 TG p. 58	LB p. 38 TG p. 60	LB p. 55 TG p. 93	LB p. 56 Already done 2e–g TG p. 97	LB p. 69 TG p. 118	LB p. 70 TG p. 119	LB p. 99 TG p. 161	LB p. 100 TG p. 167
	Cumulative Revision		Remediation: LB p. 131 not no. 13; TG p. 200 Extension: LB p. 133 not no. 2, 3, 6, 12; TG p. 201 LB p. 136 not no. 6, 17; TG p. 203					
Mind Action Series	LB p. 36 not no. 3 TG p. 21	LB p. 38 TG p. 26	LB p. 51 TG p. 43	LB p. 51 Already done 2e, g, h TG p. 46	LB p. 59 TG p. 50	LB p. 59 TG p. 51	LB p. 36 (no. 3) TG p. 22 LB p. 74 TG p. 76	LB p. 75 TG p. 79
Platinum Mathematics Glossary: LB p. 372 Term 1 Summary: LB p. 114 (Pages for memoranda are in brackets)	LB p. 30 TG p. 19 TG pp. 244 (273)	TG pp. 243; 271	LB p. 30 TG p. 30 TG pp. 246 (277)	TG pp. 245; 275	LB p. 52 TG p. 33 TG pp. 248 (280)	TG pp. 247; 279	LB p. 81 TG p. 56 TG pp. 250 (283)	TG pp. 249; 281
Survival Series Glossary: LB p. 288 Summary: LB pp. 266–274	LB pp. 266–270 LB pp. 12; 21; 33; 42 LB pp. 14; 22; 36; 43 TG pp. 22; 26; 33; 40	LB pp. 11; 20; 32; 41 TG pp. 22; 26; 32; 39	LB p. 269 LB pp. 51; 77 LB p. 52 TG p. 49	LB p. 50 TG p. 48	LB p. 270 LB p. 58 LB p. 59 TG p. 54	LB p. 57 TG p. 53	LB pp. 270–273 LB p. 77 LB p. 80 TG p. 67	LB p. 76 TG p. 67
Siyavula Everything Maths	LB pp. 37; 39 TG p. 53		LB pp. 93; 94 Already done: no. 1h, i, k, l, o, p, q, r; 2c TG p. 88		LB p. 105 TG p. 94	LB p. 102	LB pp. 78; 79 TG p. 78	

7. Assessment term plans

7.1 Term 1: Formal assessment tasks included in each set of LTSMs

LTSM	Investigation	OR	Project	End-of-term test – 60 minutes Note: More time has to be arranged for the 60-minute exemplar test as the lessons are 55 minutes each
Classroom Mathematics	Week 5 – Lesson 19 None provided	OR	Week 5 – Lesson 19 None provided	Week 9 – Lesson 43 Exemplar test (60 minutes) in Section C of this planner Resource CD to generate tests and memoranda; 45 minute tests with memoranda in TG: Algebra (p. 61), Exponents (p. 103), Patterns (p. 122), Equations and inequalities (p. 170)
Mind Action Series Pages for memoranda are in brackets	Week 5 – Lesson 19 Exponents TG p. 47 (48) OR Number patterns TG p. 53 (59)	OR	Week 5 – Lesson 19 Short project on The Golden Ratio TG p. 58 (63–64)	Week 9 – Lesson 43 Exemplar test (60 minutes) in Section C of this planner No tests provided
Platinum Mathematics	Week 5 – Lesson 19 Polygon Patterns LB p. 110; TG p. 74	OR	Week 5 – Lesson 19 None provided	Week 9 – Lesson 43 Exemplar test (60 minutes) in Section C of this planner Resource CD with test questions and memos. Topics: Algebra and equations; Patterns and sequences; and four practice tests of 50 marks each. Term 1 Test: 102 marks, one hour: LB p. 112; TG p. 76
Survival Series	Note: There are many investigations (see TG p.17) but, as explained in the LB, they are for “practise, revision and introduction to a topic”. The following two investigations may be suitable for formal assessment: Week 6 – Lesson 30 Number patterns: Sierpinski’s Triangle LB p. 53; TG p. 13 OR Substitution: Height of an adult LB p. 68; TG p. 13	OR	Week 5 – Lesson 19 Choice: Products: Incorrect assumptions LB p. 20; TG p. 14 OR Ratio: The Golden ratio LB p. 41; TG p. 14 OR Recursive rule: Invent a fractal LB p. 56; TG p. 14 OR Drawing a graph of results: Rocket science LB p. 76; TG p. 14 OR History of the development and use of Geometry and Trigonometry LB p. 103; TG p. 14 OR Parts of angles: GPS LB p. 197; TG p. 14 OR Number patterns: “Patio” LB p. 244; TG p. 14	Week 9 – Lesson 43 Exemplar test (60 minutes) in Section C of this planner No tests provided
Siyavula Everything Maths TG pp. 20; 32 requirements for and how to mark investigations/ projects	Week 5 – Lesson 19 None provided	OR	Week 5 – Lesson 19 None provided	Week 9 – Lesson 43 No tests provided
CAPS	Week 5 – Lesson 19 p. 23 in Assessment Term 1 point 1	OR	None provided	No tests provided
Note the exemplar test includes questions on:				
<ul style="list-style-type: none"> Algebraic expressions Exponents Linear, quadratic, simultaneous equations Word problems leading to the above equations 				

7.2 Term 2: Formal assessment tasks included in each set of LTSMs

LTSM	Assignment	Test <i>Note: Slightly more time has to be arranged for the 60-minute exemplar test as the lessons are 55 minutes each</i>
Classroom Mathematics	Resource CD and/or tests in the TG could be used as a source	Week 3 – Lesson 12 Euclidean Geometry exemplar test (60 minutes) in Section C of this planner
		Week 8 – Lesson 39 Algebraic Functions exemplar test (60 minutes) in Section C of this planner
		Resource CD to generate tests and memoranda; Tests with memoranda in TG as follows: Algebraic Functions (1 hour, 45 marks) TG p. 243 Euclidean Geometry (35 minutes, 35 marks) TG p. 272
Mind Action Series Mathematics	Metacog Algebraic Functions TG p. 143, Memorandum TG p. 144 Metacog Properties of Quadrilaterals TG p. 169, Memorandum p. 174 Investigation on False Conjectures (Error spotting and correction) TG p. 169, Memorandum p. 175	Week 3 – Lesson 12 Euclidean Geometry exemplar test (60 minutes) in Section C of this planner
		Week 8 – Lesson 39 Algebraic Functions exemplar test (60 minutes) in Section C of this planner
		No tests provided
Platinum Mathematics	Provided in LB hence not suitable for formal assessment Resource CD could be used as a source	Week 3 – Lesson 12 Euclidean Geometry exemplar test (60 minutes) in Section C of this planner
		Week 8 – Lesson 39 Algebraic Functions exemplar test (60 minutes) in Section C of this planner
		Resource CD with test questions and memoranda Four practice tests of 50 marks each Topics: Functions and Graphs; Euclidean Geometry
Survival Series Mathematics	Provided in LB hence not suitable for formal assessment	Week 3 – Lesson 12 Euclidean Geometry exemplar test (60 minutes) in Section C of this planner
		Week 8 – Lesson 39 Algebraic Functions exemplar test (60 minutes) in Section C of this planner
		No tests provided
Siyavula Everything Maths	None provided Requirements for and how to mark assignments/journals/orals TG pp. 29, 30, 34	Week 3 – Lesson 12 Euclidean Geometry exemplar test (60 minutes) in Section C of this planner
		Week 8 – Lesson 39 Algebraic Functions exemplar test (60 minutes) in Section C of this planner
		No tests provided
EUCLIDEAN GEOMETRY TEST <ul style="list-style-type: none"> Results established in earlier grades Definitions of special quadrilaterals Proving conjectures about the properties of special quadrilaterals Using properties in calculations and riders The Midpoint Theorem Solve problems and prove riders using the properties of parallel lines, triangles and quadrilaterals 		ALGEBRAIC FUNCTIONS TEST <ul style="list-style-type: none"> Sketching Finding equations of given graphs Interpreting graphs

8. The exemplar Term 1 test

Time: One hour

Total: 50 marks

INSTRUCTIONS TO LEARNERS:

1. There are six questions. Answer all questions.
2. Show all your calculations where necessary. Full marks will not be awarded where working out should be shown but is not.
3. Scientific non-programmable calculators may be used. If necessary, round off answers to TWO decimal places, unless stated otherwise.
4. Number the answers correctly according to the numbering system used in this question paper.
5. Write neatly and legibly.

QUESTION 1:

- 1.1 Given: $3, \dot{2}; \pi; \sqrt{-16}; 22,53$

List all the numbers that are:

1.1.1 Integers

(1)

1.1.2 Irrational numbers

(1)

- 1.2 Show that $0,1\dot{6}$ is a rational number.

(3)

- 1.3 Determine, without the use of a calculator and by showing all calculations, between which two integers $\sqrt{27}$ lies.

(2)

[7]

QUESTION 2:

Simplify the following expressions fully:

2.1 $(2x - y)(x^2 - 2xy - y^2)$

(3)

2.2 $\frac{3}{a-2} - \frac{a-4}{a^2-2a}$

(4)

[7]

QUESTION 3:

- 3.1 Factorise the following expressions fully:

3.1.1 $6x^2 - x - 12$

(2)

3.1.2 $7m^2(2p + 3) - 8p - 12$

(3)

3.1.3 $27p^3 - 8$

(3)

- 3.2 Determine the value of $\left(\frac{5}{x} - \frac{x}{5}\right)^2$ if $\frac{5}{x} - \frac{x}{5} = 5$.

Hence, show that the value of $\frac{125}{x^3} - \frac{x^3}{125}$ is 140.

(4)

[12]

QUESTION 4:

Simplify and write all the answers with positive exponents:

4.1 $\frac{(p^{-2})^3 \cdot (-2p)^3}{16}$ (4)

4.2 $\frac{12^x \cdot 9}{3^{(x+1)} \cdot 2^{2x}}$ (4)

[8]**QUESTION 5:**

Solve for x in each case:

5.1 $3 \cdot 3^{(x-3)} = \frac{1}{81}$ (3)

5.2 $\frac{2}{x} = \frac{3}{x-2}$ (3)

5.3 $x^2 = 21x$ (4)

[10]**QUESTION 6:**

Ms Shoko has 38 children in her class. The average mass of the boys is 35 kg, the average mass of the girls is 32 kg and the total mass of all 38 children is 1 270 kg.

Determine how many boys and how many girls are in her class.

[6]**TOTAL: 50**

9. Memorandum and analysis of cognitive levels in the Term 1 test

Underline errors committed by learners and apply Consistent Accuracy (CA) marking. This means the learner loses the mark for each mistake made and you mark the rest of the answer according to their mistake(s). However, if the learner shows a lack of understanding of the concept, no marks are given. Also, if the learner has made the question easier, no marks are given from that part onwards.

For example: Simplify $\frac{2x+1}{6} - \frac{x+2}{9x}$ (4)

Correct solution	Sign error
$\frac{2x+1}{6} - \frac{x+2}{9x}$ $= \frac{3x(2x+1) - 2(x+2)}{18x} \checkmark \text{ numerator}$ $= \frac{6x^2 + 3x - 2x - 4}{18x} \checkmark \times \text{ out correctly CA}$ $= \frac{6x^2 + x - 4}{18x} \checkmark \text{ Answer CA}$	$\frac{2x+1}{6} - \frac{x+2}{9x}$ $= \frac{3x(2x+1) - 2(x+2)}{18x} \checkmark$ $= \frac{6x^2 + 3x - 2x + 4}{18x} \text{ Lose mark: sign error (underline +)}$ $= \frac{6x^2 + x + 4}{18x} \checkmark \text{ CA}$
Denominator error	
$\frac{2x+1}{6} - \frac{x+2}{9x}$ $= \frac{3x(2x+1) - 2(x+2)}{18x} \checkmark$ <p>Lose mark no denominator (underline $6x^2 + 3x - 2x - 4$)</p> $= 6x^2 + 3x - 2x - 4$ $= \frac{6x^2 + x + 4}{18x} \text{ Lose mark for putting denominator back or if still no denominator}$ <p>i.e. lose 2 marks for no denominator</p>	

SOLUTIONS	MARKS	COGNITIVE LEVELS
QUESTION 1:		
1.1.1 $\frac{0}{9} \checkmark$	(1)	K
1.1.2 $\pi \checkmark$	(1)	K
1.2 Let $x = 0,1\dot{6}$		
Then $100x = 16,161616\dots \checkmark \times 100$		
subtract $x = 0,161616\dots \checkmark \times 1$		
$99x = 16$		
$x = \frac{16}{99} \checkmark \text{ Answer}$	(3)	R
1.3 $\sqrt{25} < \sqrt{27} < \sqrt{36} \checkmark \text{ for } \sqrt{25} \text{ and } \sqrt{36}$		
$\therefore \sqrt{27} \text{ lies between } 5 \text{ and } 6 \checkmark \text{ answer in a sentence}$	(2)	K

SOLUTIONS	MARKS	COGNITIVE LEVELS
QUESTION 2:		
<p>2.1 $(2x - y)(x^2 - 2xy - y^2)$ $= 2x^3 - 4x^2y - 2xy^2 - x^2y + 2xy^2 + y^3$ ✓ distributing $2x$ correctly; ✓ distributing correctly $= 2x^3 - 5x^2y + y^3$ ✓ CA</p>	(3)	R
<p>2.2 $\frac{3}{a-2} - \frac{a-4}{a^2-2a}$ $= \frac{3}{a-2} - \frac{a-4}{a(a-2)}$ ✓ factorise denominator $= \frac{3a - (a-4)}{a(a-2)}$ ✓ numerator $= \frac{3a - a + 4}{a(a-2)}$ ✓ simplify (no marks if no denominator) $= \frac{2a+4}{a(a-2)}$ ✓ answer (no marks if no denominator)</p>	(4)	C
QUESTION 3:		
<p>3.1.1 $6x^2 - x - 12$ $= (3x + 4)(2x - 3)$ ✓ (one mark if only the signs are wrong)</p>	(2)	R
<p>3.1.2 $7m^2(2p + 3) - 8p - 12$ $= 7m^2(2p + 3) - 4(2p + 3)$ ✓ grouping correctly $= (2p + 3)(7m^2 - 4)$ ✓✓ each factor</p>	(3)	R
<p>3.1.3 $27p^3 - 8 = (3p - 2)(9p^2 + 6p + 4)$ ✓ factor ✓ factor ✓ signs correct</p>	(3)	R
<p>3.2 $\left(\frac{5}{x} - \frac{x}{5}\right)^2 = 5^2 = 25$ ✓ knowing to square both sides $\therefore \frac{125}{x^2} - 2 + \frac{x^2}{25} = 25 \dots [1]$ $\frac{125}{x^3} - \frac{x^3}{125} = \left(\frac{5}{x} - \frac{x}{5}\right)\left(\frac{25}{x^2} + 1 + \frac{x^2}{25}\right)$ ✓ factor ✓ factor ✓ factor From [1] $\frac{25}{x^2} + \frac{x^2}{25} = 27$ ✓ CA $\therefore \frac{125}{x^3} - \frac{x^3}{125} = (5)(28) = 140$</p>	(4)	C
QUESTION 4:		
<p>4.1 $\frac{(p^{-2})^3 \cdot (-2p)^3}{16} = \frac{p^{-6} \cdot -8p^3}{16}$ ✓ apply law to either $= \frac{-8\sqrt{p^{-3}}}{16}$ ✓ simplifying $= \frac{-1}{2p^3}$ ✓ answer</p>	(4)	R
<p>4.2 $\frac{12 \cdot 9}{3^{(x+1)} \cdot 2^{2x}} = \frac{(2^2 \cdot 3) \cdot x \cdot 3^2}{3^{(x+1)} \cdot 2^{2x}}$ ✓ prime bases in numerator $= \frac{2^{2x} \cdot 3^{\sqrt{3^2}}}{3^{(x+1)} \cdot 2^{2x}}$ ✓ apply law $= 2^{2x-2x} \cdot 3^{x+2-x-1}$ ✓ apply law $= 3$ ✓ simplify</p>	(4)	C

SOLUTIONS	MARKS	COGNITIVE LEVELS			
<p>QUESTION 5:</p> <p>5.1 $3 \cdot 3^{(x-3)} = \frac{1}{81}$ OR $3 \cdot 3^{(x-3)} = \frac{1}{81}$ $3^{1+x-3} = 3^{-4}$ ✓ same bases $3^{x-3} = 3^{-5}$ $x - 2 = -4$ ✓ equate exponents $x - 3 = -5$ $x = -2$ ✓ answer $x = -2$</p> <p>5.2 $\frac{2}{x} = \frac{3}{x-2}$ $\frac{2(x-2)}{x(x-2)} = \frac{3x}{x(x-2)}$ ✓ numerators $2x - 4 = 3x$ ✓ simplifying $x = -4$ ✓ answer</p> <p>5.3 $x^2 = 21x$ $x^2 - 21x = 0$ ✓ make one side 0 $x(x - 21) = 0$ ✓ factorise $x = 0$ ✓ or $x = 21$ ✓ answers</p>	<p>(3)</p> <p>(3)</p> <p>(4)</p>	<p>R</p> <p>R</p> <p>R</p>			
<p>QUESTION 6:</p> <p>Let the number of boys be x and the number of girls be y OR the answer is written in words ✓</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> $x + y = 38$ $35x + 32y = 1\ 270$ using 2 variables ✓ $\therefore y = 38 - x$ rearranging ✓ Substitute into $35x + 32y = 1\ 270$ $35x + 32(38 - x) = 1\ 270$ ✓ $35x + 1\ 216 - 32x = 1\ 270$ $3x = 54$ $\therefore x = 18$ ✓ Substitute into $y = 38 - x$ $\therefore y = 38 - (18) = 20$ ✓ </td> <td style="width: 50%; vertical-align: top; text-align: center;"> OR </td> <td style="width: 50%; vertical-align: top;"> $x + y = 38$ $35x + 32y = 1\ 270$ using 2 variables ✓ $\therefore x = 38 - y$ rearranging ✓ Substitute into $35x + 32y = 1\ 270$ $35(38 - y) + 32y = 1\ 270$ ✓ $1\ 330 - 35y + 32y = 1\ 270$ $-3y = -60$ $\therefore y = 20$ ✓ Substitute into $x = 38 - y$ $\therefore x = 38 - (20) = 18$ ✓ </td> </tr> </table>	$x + y = 38$ $35x + 32y = 1\ 270$ using 2 variables ✓ $\therefore y = 38 - x$ rearranging ✓ Substitute into $35x + 32y = 1\ 270$ $35x + 32(38 - x) = 1\ 270$ ✓ $35x + 1\ 216 - 32x = 1\ 270$ $3x = 54$ $\therefore x = 18$ ✓ Substitute into $y = 38 - x$ $\therefore y = 38 - (18) = 20$ ✓	OR	$x + y = 38$ $35x + 32y = 1\ 270$ using 2 variables ✓ $\therefore x = 38 - y$ rearranging ✓ Substitute into $35x + 32y = 1\ 270$ $35(38 - y) + 32y = 1\ 270$ ✓ $1\ 330 - 35y + 32y = 1\ 270$ $-3y = -60$ $\therefore y = 20$ ✓ Substitute into $x = 38 - y$ $\therefore x = 38 - (20) = 18$ ✓	<p>(6)</p>	<p>P</p>
$x + y = 38$ $35x + 32y = 1\ 270$ using 2 variables ✓ $\therefore y = 38 - x$ rearranging ✓ Substitute into $35x + 32y = 1\ 270$ $35x + 32(38 - x) = 1\ 270$ ✓ $35x + 1\ 216 - 32x = 1\ 270$ $3x = 54$ $\therefore x = 18$ ✓ Substitute into $y = 38 - x$ $\therefore y = 38 - (18) = 20$ ✓	OR	$x + y = 38$ $35x + 32y = 1\ 270$ using 2 variables ✓ $\therefore x = 38 - y$ rearranging ✓ Substitute into $35x + 32y = 1\ 270$ $35(38 - y) + 32y = 1\ 270$ ✓ $1\ 330 - 35y + 32y = 1\ 270$ $-3y = -60$ $\therefore y = 20$ ✓ Substitute into $x = 38 - y$ $\therefore x = 38 - (20) = 18$ ✓			

10. Weighting of cognitive levels in the Term 1 test

The table below shows the weighting of marks across the cognitive levels in the exemplar test provided. As can be seen, this differs slightly from the suggested weightings in CAPS. This is acceptable, provided the two lower cognitive levels add up to approximately 55%, while the two higher levels add up to approximately 45%. In this exemplar test, the two lower levels together account for 58% of the marks, and the two higher for 42%.

Cognitive level	Marks out of 50 in test	% marks in test	Percentage of marks at each level prescribed by the CAPS (p. 53)
Knowledge (K)	4	8%	≈ 20%
Routine Procedures (RP)	28	56%	≈ 35%
Complex Procedures (CP)	12	24%	≈ 30%
Problem Solving (PS)	6	12%	≈ 15%

16. Weighting of cognitive levels in the Term 2 algebraic functions test

The table below shows the weighting of marks across the cognitive levels in the Algebraic Functions exemplar test provided in this section. As can be seen, this differs slightly from the suggested weightings in the CAPS. This is however acceptable, provided the two lower cognitive levels add up to approximately 55%, while the two higher levels add up to approximately 45%. In this exemplar test, the two lower levels together account for 54% of the marks, and the two higher for 46%.

Cognitive level	Marks out of 50 in exam	% marks in test	Percentage of marks at each level prescribed by the CAPS (p. 53)
Knowledge (K)	6	12%	≈ 20%
Routine Procedures (RP)	21	42%	≈ 35%
Complex Procedures (CP)	20	40%	≈ 30%
Problem Solving (PS)	3	6%	≈ 15%

17. Exemplar formal assessment mark record sheets

17.1 Term 1

Gr 10 Mathematics: Formal assessment mark record sheet Term 1		Investigation/ Project	Test 1	Term 1		Date of assessment: NAME AND SURNAME																								
				Original mark out of ...	Term 1 Weighting /25	SBA Weighting /20	/50	Term 1 Weighting /75	SBA Weighting /10	Total	Term 1 %	Rating (1-7)																		

Gr 10 Mathematics: Formal assessment mark record sheet Term 2	Assignment/Test	Mid-year Examination			Term 2			
		Original mark	SBA weighting	Original mark	SBA weighting	Total	Term 2 %	Rating (1-7)
		..	/10	..	/30	..	%	1-7
	Mark out of:		
	Date of assessment:							
	NAME AND SURNAME							

18. Templates for tracking, reflecting on and reporting curriculum coverage

18.1 Conventional schools¹

NAME OF TEACHER: _____ SUBJECT/GRADE: _____

Week no. in planner _____

Week no. in term when work planned for week started _____

Refer to the planner¹ for details of the week's work (or the ATP for subjects without planners)

Class (or subject for FP)				
On track by end of week? (Yes/no)				
How many learners are working confidently? ² (Rough estimate)				
How many learners in this class?				
DAY ³	BRIEF NOTES ON THE DAY'S WORK: Consider such things as: <i>What concepts/skills did the learners struggle with or manage well in this lesson? What could be the reasons for this? Did the class complete the work you had planned? Do you need to change your plans for the next lesson? What changes will you make?</i>			
1				
2				
3				
4				
5				
Reflection on the week: Think about and make a note of:				
What concepts and skills for the week did learners struggle with? What could you do differently next time to better support or extend learning? What good practice could you share?			Did you cover the curriculum for the week? If not, what were some of the challenges? What can you do to catch up? What help do you need? How will your progress this week affect your plan for next week?	
DH:			Date:	

¹ Please amend this draft template to suit the needs of your school.

¹ You can use any planning document (such as the CAPS planner, the ATP or printed lesson plans) as the basis for your tracking.

² Estimate of learners in that grade that are working confidently at Level 4 (adequate achievement) or above.

³ This can also be lessons if there are more than five lessons a week.

18.2 Multigrade schools¹

NAME OF TEACHER: _____

Week no. in planner _____

Week no. in term when work planned for week started _____

Refer to the planner² for details of the week's work (or the ATP for subjects without planners)

Subjects							
GRADE	On track this week? ³						
	Est. learners > Level 4 ⁴						
	# learners in grade						
GRADE	On track this week?						
	Est. learners > Level 4						
	# learners in grade						
GRADE	On track this week?						
	Est. learners > Level 4						
	# learners in grade						
DAY	BRIEF NOTES ON THE DAY'S WORK: Consider such things as: <i>What concepts/skills did the learners struggle with or manage well in this lesson? What could be the reasons for this? Did the class complete the work you had planned? Do you need to change your plans for the next lesson? What changes will you make?</i>						
1							
2							
3							
4							
5							
Reflection on the week: Think about and make a note of:							
SUBJECT	What concepts and skills for the week did learners struggle with? What could you do differently next time to better support or extend learning? What good practice could you share?	Did you cover the curriculum for the week? If not, what were some of the challenges? What can you do to catch up? What help do you need? How will your progress this week affect your plan for next week?					
Principal:				Date:			

¹ Please amend this draft template to suit the needs of your school.

² You can use any planning document (such as the CAPS planner, the ATP or printed lesson plans) as the basis for your tracking.

³ Yes/no?

⁴ Estimate of learners in that grade that are working confidently at Level 4 (adequate achievement) or above.