NATIONAL EDUCATION COLLABORATION TRUST

education
Department:
Education
PROVINCE OF KWAZULU-NATAL

GRADE 12
MATHEMATICS

TEACHER TOOLKIT

CAPS Planner

TERMS 1 & 2

Jika iMfundo
what I do matters

ENDORSED BY

GRADE 12

Mathematics

Teacher Toolkit:
CAPS Planner

TERMS 1 & 2

Published in 2020 by Jika iMfundo.
Jik'iMfundo is a programme to improve learning outcomes, funded by the National Education Collaboration Trust, the KwaZulu-Natal Department of Education and others.

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ISBN: 978-1-990904-63-9

Materials development by the PILO team along with representatives from the districts and province.

Publishing management by The Word Horse, www.wordhorse.co.za
Design by COMPRESS.dsl, www.compressdsl.com
Typesetting by The Maas Group, www.themaasgroup.com

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A. INTRODUCTION

This book is intended to help you cover the curriculum for Grade 12 Mathematics in Terms 1 and 2. There is a companion book for Term 3. Teachers should keep these books to use from year to year.

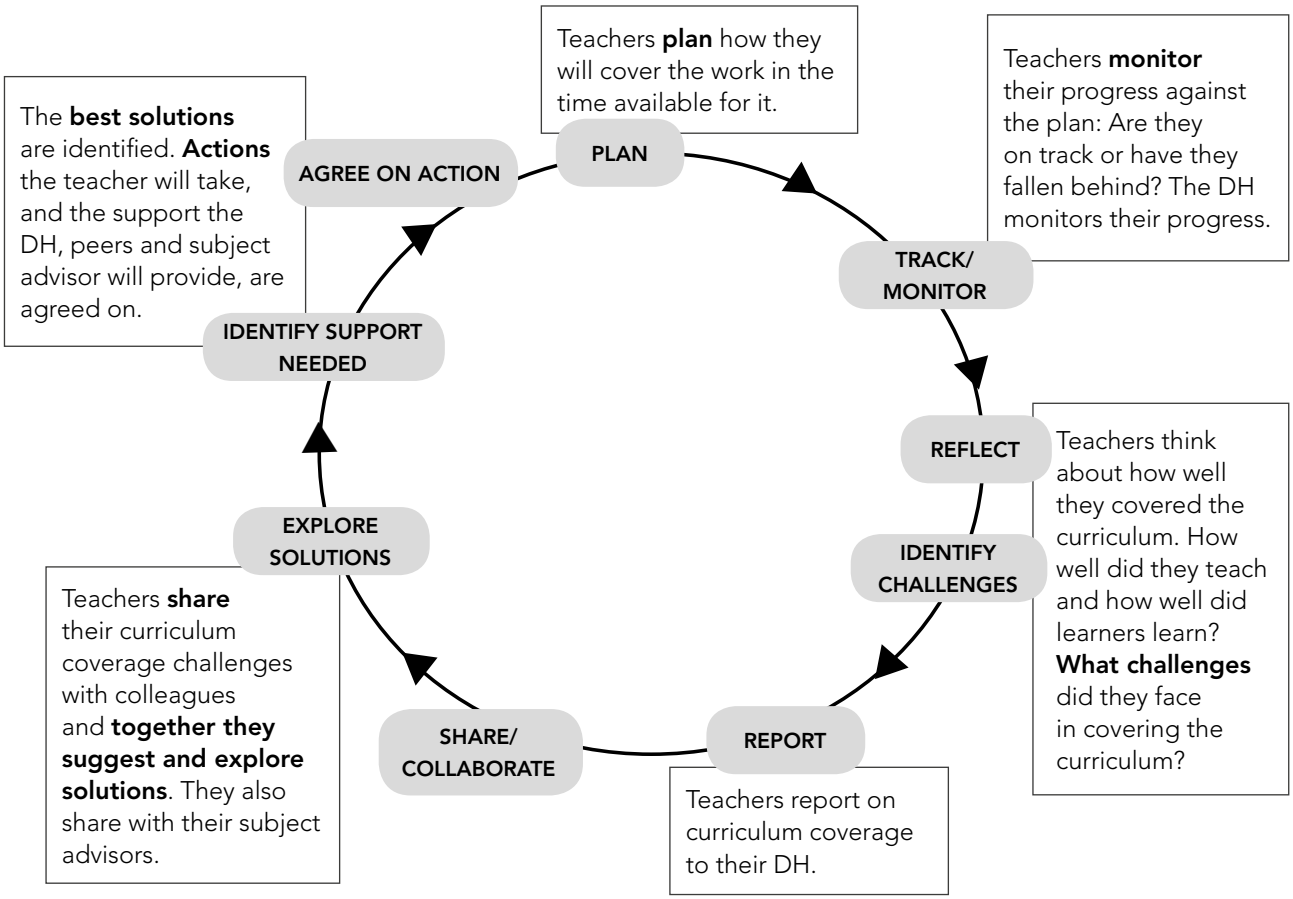
1. The need to improve curriculum coverage

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 12 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 planners were compiled a few years ago, and the sequence of topics in them follows the annual teaching plan (ATP) of the KZN Department of Education at that time. Since then, the order of topics of the ATP has changed substantially. Please, therefore, follow the current 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 Week 4 from *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 4** *Select						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
14	Develop an understanding of concavity, points of inflection and the second derivative test; Sketch cubic functions cont.	216–220	9.2 (no. 1–3)	285–287	6–8 (pp. 233–235)	282–284
15	Sketch cubic functions cont.	220	9.2 (no. 4–8)	288–292	6–9 (pp. 236–240)	284–286
16	Calculate values from the graphs (graph interpretation)	221–225	9.3 (no. 1–6)*	293–296	6–10 (pp. 241–245)	286–295
17	Calculate values from the graphs (graph interpretation) including the derivative graph	226–227	9.3 (no. 7–11)	296–299		
18	**Formal assessment: Investigation**					
Note: Refer to lessons 18 and 19: There is no investigation relating to the topics for this term, so an investigation may be sourced from another set of LTSMs. One example may be an investigation relating to optimisation (maxima and minima).						

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
• 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 three formal assessment tasks for Term 1 (a project/investigation, an assignment and a test) and two for Term 2 (a test and an examination).[1]

Formal assessment programmes in the LTSMs and planners

Resource 4 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 18. 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.

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.

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 and Term 2 tests and the mid-year examination, use an exemplar 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.

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

An exemplar Term 1 test is provided in Resource 5, with a marking memorandum together with an analysis of cognitive levels in Resource 6. Resource 7 shows the weighting of marks in the test across the cognitive levels compared with the weighting specified in the CAPS (p. 53).

3.3 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 8 is a Euclidean geometry test and Resource 11 an algebraic functions test. The tests have marking memorandums and an analysis according to the weightings of cognitive levels specified in the CAPS (see Resources 9, 10, 12 and 13).

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 provided as a basis for setting your own mid-year examination.

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

3.4 A sheet of formulae for learners

A sheet of formulae that can be copied for learners to use in both Terms 1 and 2 is provided. Learners can take this into the examination for their reference.

Assessment resources described in 3.2 to 3.4 above support curriculum coverage by:

- supporting learning by providing a photocopiable sheet of formulae for learners so that they can refer to it and do not have to memorise the formulae;
- 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).

3.5 Exemplar formal assessment mark record sheets

Resource 15 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 completion support cycle (Figure 1), and you have seen how the material in this book supports teachers with planning. The templates provided as Resource 16 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:** *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?*
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?**
DH:	**Date:**

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.

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.

1. PLANNERS FOR TERM 1

1.1 *Classroom Mathematics*

CLASSROOM MATHEMATICS Week 1						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
1	**Functions: Polynomials CAPS p. 44** Discuss the definition of a polynomial	170–172	7.1	234	5–1 (pp. 178–179)	232–234
2	Use long division to divide a polynomial by a binomial	173–175	7.2	235	5–3 (pp. 184–190)	238–246
3	Find the remainder using the Remainder Theorem; Determine the value of an unknown given the remainder	176–178	7.3	236	5–4 (pp. 191–194)	246–250

CLASSROOM MATHEMATICS Week 2 *Select						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
4	Factorise third-degree polynomials using the Factor Theorem; Determine the value of an unknown when the divisor is a factor	178–180	7.4*	237	5–5 (pp. 195–198)	250–251
5	Solve third-degree polynomial equations using the Factor Theorem	181–183	7.5*	238–239	5–6 (pp. 199–201)	252–254
6	**Differential Calculus: CAPS pp. 45–46** Determine the average gradient of a function	186–191	8.1	246–248		
7	Introduce and understand the limit concept intuitively	192–194	8.2	249–251	6–1 (pp. 204–211)	260–263
8	Understand the limit concept intuitively cont.; Determine the gradient of a curve at a point	195–197	8.3*	252–253	6–2 (pp. 211–216)	263–265

CLASSROOM MATHEMATICS Week 3 *Select						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
9	Determine the derivative function $f'(x)$ from first principles (differentiation)	198–199	8.4	254–256	6–3 (pp. 216–220)	266–269
10	Determine the value of a derivative at a point (using first principles); Analyse findings from first principles to develop and apply the rules for differentiation; Understand alternative notations	200–204	8.5* 8.6 (no. 1–2)	257–258		
11	Apply the rules for differentiation cont.	204–205	8.6 (no. 3–6)	258–261	6–4 (pp. 221–224)	269–272
12	Find equations of tangents to graphs of functions; Introduce the second derivative	205–208	8.7 8.8*	261–264	6–5, 6–6 (pp. 224–230)	272–278
13	Determine stationary points and sketch the graphs of cubic polynomial functions	212–216	9.1*	275–284	6–7 (pp. 230–232)	278–282
Note: Refer to lesson 13: Introduction of the second derivative is optional at this stage – its relevance can be better understood when sketching curves (see lesson 14).						

CLASSROOM MATHEMATICS Week 4 *Select						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
14	Develop an understanding of concavity, points of inflection and the second derivative test; Sketch cubic functions cont.	216–220	9.2 (no. 1–3)	285–287	6–8 (pp. 233–235)	282–284
15	Sketch cubic functions cont.	220	9.2 (no. 4–8)	288–292	6–9 (pp. 236–240)	284–286
16	Calculate values from the graphs (graph interpretation)	221–225	9.3 (no. 1–6)*	293–296	6–10 (pp. 241–245)	286–295
17	Calculate values from the graphs (graph interpretation) including the derivative graph	226–227	9.3 (no. 7–11)	296–299		
18	**Formal assessment: Investigation**					
Note: Refer to lessons 18 and 19: There is no investigation relating to the topics for this term, so an investigation may be sourced from another set of LTSMs. One example may be an investigation relating to optimisation (maxima and minima).						

CLASSROOM MATHEMATICS Week 5						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
19	**Formal assessment: Investigation cont.**					
20	Solve practical problems concerning optimisation (apply differentiation in calculating maximum and minimum values)	228–231	9.4 (no. 1–6)	300–302	6–11 (pp. 245–251)	295–300
21	Solve practical problems concerning optimisation cont.	231–232	9.4 (no. 7–14)	302–305		
22	Solve practical problems concerning rates of change	233–235	9.5	306	6–12 (pp. 252–255)	300–303
23	Solve practical problems concerning the calculus of motion	236–239	9.6	307–308		

CLASSROOM MATHEMATICS Week 6 *Select						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
24	**Trigonometry – compound angles: CAPS p. 42** Revise trigonometric equations	128–131	5.1*–5.2*	170–176	4–1 (no. 1–7) (pp. 138–143)	172–177
25	Revise trigonometric identities; Determine restrictions on variables in trig. identities	132–136	5.3–5.4	176–178	4–1 (no. 8–10) (p. 144)	177–180
26	Introduce and derive compound angle identities; Expand and simplify expressions involving compound angles	136–138	5.5	179–180	4–2 (pp. 144–150)	180–186
27	Prove identities involving compound angle identities	139–140	5.6	181–183		
28	Derive double angle identities; Prove identities using double angle formulae	140–142	5.7 (no. 1a–g)	183–184	4–3 (pp. 151–154)	186–191
Note: The proof of the identity $\cos(\alpha - \beta) = \cos\alpha\cos\beta + \sin\alpha\sin\beta$ is not examinable, but it should be explained. The other compound angle identities follow – the derivations of these are examinable (lesson 26).						

CLASSROOM MATHEMATICS Week 7 *Select						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
29	Prove identities using double angle formulae	142	5.7 (no. 1h–r)	184–186		
30	Simplify and evaluate expressions using the compound angle and double angle identities	143–145	5.8 (no. 1*–7)	186–189		
31	Simplify and evaluate expressions using the compound angle and double angle identities cont.	145	5.8 (no. 8–18)	189–192		
32	Solve trigonometric equations using compound angle and double angle identities	145–147	5.9 (no. 1–3)	193–195	4–4 (pp. 154–160)	191–198
33	Solve trigonometric equations using compound angle and double angle identities cont.	147	5.9 (no. 4–10)	195–197		
Note: If not complete, exercise 5.9 (trig. equations) may be finished at home. *Check your skills* (LB p. 148; TG pp. 197–201) should also be done at home for consolidation.						

CLASSROOM MATHEMATICS Week 8 #Supplement						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
34	Draw and work with trigonometric graphs involving compound angle identities	394–395 400	Ex. A (no. 6,9) Ex. B (no. 4) #	499–500; 509	4–7 (no. 11–14; 16) (pp. 173–174)	218–223
35	**Formal assessment: Assignment** (use *Trig. test*)			205 Memo. 206–208		
36	**Trigonometry: Solve problems in two and three dimensions: CAPS p. 44** Revise sine, cosine and area rules (two dimensions)	153–155	6.1	221–224	4–5 (pp. 161–164)	198–202
37	Solve problems in three dimensions	155–157	6.2 (no. 1–4)	225–226	4–6 (pp. 165–170)	203–209
38	Solve problems in three dimensions cont.	157–158	6.2 (no. 5–9)	227–228		

CLASSROOM MATHEMATICS Week 9 *Select						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
39	Solve problems in three dimensions cont.	159–163	6.3*	229		
40	Solve problems in three dimensions involving compound angle identities	164–165	6.4	230–231	4–7 (no. 17–22) (pp. 174–176)	224–230
41	**Analytical Geometry: CAPS p. 47** Revise analytical geometry done in previous grades	244–248	10.1	321–326	7–1, 7–2 (pp. 264–275)	326–342
42	Determine the equation of a circle with centre the origin and radius r and solve related problems	249–253	10.2	326–331	7–3 (pp. 275–283)	342–351
43	Determine the equation of a circle with centre $(a; b)$ and radius r and solve related problems	254–256	10.3 (no. 1–4)	333–336	7–4 (pp. 283–294)	351–360
Note: Review marked assignment when time allows – provide full solutions to learners.						

CLASSROOM MATHEMATICS Week 10 *Select						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
44	Determine the equation of a circle with centre $(a; b)$ and radius r and solve related problems cont.	257	10.3 (no. 5–10)	336–341		
45	Determine the equation of a tangent to a circle	258–263	10.4 (no. 1–6)*	341–346	7–5 (pp. 294–305)	360–368
46	Solve problems involving tangents and circles	263–264	10.4 (no. 7–15)*	346–356		
47	**Formal assessment: Test**					
48	Revise analytical geometry	265–267	10.5 (no. 1; 2; 8–12) 10.6 (no. 1–3)	357–371	7–6 (pp. 307–309)	369–381
Note: Analytical Geometry: For circles which touch/do not touch/intersect, see note in *Everything Maths* LB p. 292.						

1.2 *Clever: Keeping Maths Simple*

CLEVER: KEEPING MATHS SIMPLE Week 1						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
1	**Functions: Polynomials CAPS p. 44** Discuss the definition of a polynomial	162–163	8.1	151–153	5–1 (pp. 178–179)	232–234
2	Use long division to divide a polynomial by a binomial; Introduce the Remainder Theorem	163–167	8.2	153	5–3 (pp. 184–190)	238–246
3	Introduce the Factor Theorem; Determine the quotient and remainder by synthetic division; Factorise polynomials	167–169	8.3–8.4	153–154		

CLEVER: KEEPING MATHS SIMPLE Week 2 *Select						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
4	Factorise third-degree polynomials using inspection; Factorise expressions in two variables	169–172	8.5*–8.6*	154–155	5–5 (pp. 195–198)	250–251
5	Use the Remainder Theorem to determine the value of unknown coefficients; Solve cubic equations	172–174	8.7*–8.8	155	5–4 (pp. 191–194) 5–6 (pp. 199–201)	246–250 252–254
6	**Differential Calculus: CAPS pp. 45–46** Introduce and understand the limit concept intuitively	177–179	9.1–9.2	163–166	6–1 (pp. 204–211)	260–263
7	Determine the average gradient of a function at a point	180–183	9.3	166–168	6–2 (pp. 211–216)	263–265
8	Investigate the gradient at a point; Determine the derivative function $f'(x)$ from first principles (differentiation)	183–187	9.4 9.5 (no. 1–5)	168–170	6–3 (pp. 216–220)	266–269

CLEVER: KEEPING MATHS SIMPLE Week 3 *Select						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
9	Determine the derivative function $f'(x)$ from first principles (differentiation) cont.	187	9.5 (no. 6–14)	170–173		
10	Analyse findings from first principles to develop and apply the rules for differentiation; Understand alternative notations	187–190	9.6 (no. 1–3)	173–174	6–4 (pp. 221–224)	269–272
11	Apply the rules for differentiation cont.	191	9.6 (no. 4–12)	174–176		
12	Find the gradient of a tangent to a graph of a function or determine the point if the gradient is given; Determine the equation of a tangent; Determine the equation of a normal	192–198	9.7* 9.8* 9.9*	176–180	6–5 (pp. 224–228)	272–275
13	Determine stationary points, understand concavity, points of inflection and the second derivative test; Sketch the graphs of cubic polynomial functions	198–209	9.10 (no. 1–6)	181–182	6–6, 6–7 (pp. 229–232)	276–282

CLEVER: KEEPING MATHS SIMPLE Week 4 *Select						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
14	Sketch cubic functions cont.	209	9.10 (no. 7–14)	182–183	6–8 (pp. 233–235)	282–284
15	Sketch cubic functions cont.	209	9.10 (no. 15–22)	183–184	6–9 (pp. 236–240)	284–286
16	Solve problems based on curve sketching (graph interpretation)	209–214	9.11	184–187		
17	Derive the equation of a cubic function from the graph (graph interpretation); Draw rough sketches given information; The derivative graph (use *Everything Maths*)	214–221	9.12* 9.13*	187–190	6–10 (pp. 241–245)	286–295
18	**Formal assessment: Investigation**					
Note: Refer to lessons 18 and 19: There is no investigation relating to the topics for this term, so an investigation may be sourced from another set of LTSMs. One example may be an investigation relating to optimisation (maxima and minima).						

CLEVER: KEEPING MATHS SIMPLE Week 5						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
19	**Formal assessment: Investigation cont.**					
20	Solve practical problems concerning optimisation (maxima and minima)	221–225	9.14	190–191	6–11 (pp. 245–251)	295–300
21	Solve practical problems involving maxima and minima cont.	225–230	9.15	192–194		
22	Solve practical problems concerning rates of change	230–231 234–235	9.16 (no. 4; 6; 8)	196–197	6–12 (pp. 252–255)	300–303
23	Solve problems concerning the calculus of motion	232–235	9.16 (no. 1; 3; 5; 7)	195–197		

CLEVER: KEEPING MATHS SIMPLE Week 6 *Select						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
24	**Trigonometry – compound angles: CAPS p. 42** Revise Grade 11 Trigonometry (use *Everything Maths*)				4–1 (pp. 138–144)	172–180
25	Introduce and derive compound angle identities; Expand and simplify expressions involving compound angles	108–111	5.1	97–99	4–2 (pp. 144–150)	180–186
26	Prove identities using compound angle identities	112–113	5.2	99–100		
27	Prove identities and use the theorem of Pythagoras in problems involving compound angles	113–116	5.3*–5.4*	100–102		
28	Derive double angle identities; Simplify and evaluate expressions and prove identities using double angle formulae	116–118	5.5	102–103	4–3 (pp. 151–154)	186–191
Note: The proof of the identity $\cos(\alpha - \beta) = \cos\alpha\cos\beta + \sin\alpha\sin\beta$ is not examinable, but it should be explained. The other compound angle identities follow – the derivations of these are examinable (lesson 25).						

CLEVER: KEEPING MATHS SIMPLE Week 7 *Select						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
29	Simplify and evaluate expressions and prove identities using double angle formulae	119–120	5.6	104–105		
30	Prove identities using double angle formulae	120–122	5.7 (no. 1–9)	105		
31	Prove identities using double angle formulae cont.	123	5.7 (no. 10–17)	105–106		
32	Revise Grade 11 trigonometric equations	124–127	6.1* 6.2* 6.3*	116–118		
33	Solve trigonometric equations using compound angle and double angle identities	127–129	6.4	119	4–4 (pp. 154–160)	191–198
Note: Exercise 6.5 trig. equations (LB p. 130; TG p. 119) may be done at home. The *Revision Exercise* (LB p. 123; TG pp. 106–107) should also be done at home for consolidation.						

CLEVER: KEEPING MATHS SIMPLE Week 8 *Select						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
34	Draw and work with trigonometric graphs involving compound angle identities	130–133	Rev. ex.	120	4–7 (no. 11–14; 16) (pp. 173–174)	218–223
35	**Formal assessment: Assignment** (use *Practice test Trig.*)			114 Memo. 115		
36	**Trigonometry: Solve problems in two and three dimensions: CAPS p. 44** Revise sine, cosine and area rules (two dimensions)	134–144	7.1*	128–131	4–5 (pp. 161–164)	198–202
37	Solve problems in three dimensions	144–151	7.2 (no. 1–5)	131–132	4–6 (pp. 165–170)	203–209
38	Solve problems in three dimensions cont.	151–154	7.2 (no. 6–13)	132–133		

CLEVER: KEEPING MATHS SIMPLE Week 9 *Select						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
39	Prove identities using the sine, cosine and area rules	155–157	7.3	133–135		
40	Solve problems in three dimensions, some problems involving compound angle identities	158–161	Rev. ex.*	135–136	4–7 (no. 17–22) (pp. 174–176)	224–230
41	**Analytical Geometry: CAPS p. 47** Revise analytical geometry done in previous grades (use *Everything Maths*)	238		210–211	7–1, 7–2 (pp. 264–275)	326–342
42	Determine the equation of a circle with centre the origin and radius r and solve related problems (use *Everything Maths*)				7–3 (pp. 275–283)	342–351
43	Determine the equation of a circle with centre $(a; b)$ and radius r and solve related problems	239–242	10.1	211–213	7–4 (pp. 283–294)	351–360
Note: Review marked assignment when time allows – provide full solutions to learners.						

CLEVER: KEEPING MATHS SIMPLE Week 10 *Select						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
44	Determine the equation of a circle with centre $(a; b)$ and radius r and solve related problems cont.	242–248	10.2	213–216		
45	Determine the equation of a tangent to a circle	248–250	10.3*	217–219	7–5 (pp. 294–305)	360–368
46	Solve problems involving tangents and circles	251–257	10.4 (no. 1–6)	219–223		
47	**Formal assessment: Test**					
48	Solve problems involving tangents and circles	258–260	10.4 (no. 7–14)	223–227	7–6 (pp. 307–309)	369–381
Note: Analytical Geometry: For circles which touch/do not touch/intersect, see note in *Everything Maths* LB p. 292.						

1.3 *Maths Handbook and Study Guide*

MATHS HANDBOOK AND STUDY GUIDE Week 1						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
1	**Functions: Polynomials CAPS p. 44** Discuss the definition of a polynomial (use *Everything Maths*)				5–1 (pp. 178–179)	232–234
2	Use long division to divide a polynomial by a binomial (use *Everything Maths*)				5–3 (pp. 184–190)	238–246
3	Find the remainder using the Remainder Theorem; Determine the value of an unknown given the remainder (use *Everything Maths* for ex.)	132–133		53	5–4 (pp. 191–194)	246–250

MATHS HANDBOOK AND STUDY GUIDE Week 2						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
4	Determine the value of an unknown when the divisor is a factor; Factorise third-degree polynomials using the Factor Theorem	134–137 160	1	55	5–5 (pp. 195–198)	250–251
5	Solve third-degree polynomials using the Factor Theorem (use *Everything Maths* for ex.)	137–138			5–6 (pp. 199–201)	252–254
6	**Differential Calculus: CAPS pp. 45–46** Introduce and understand the limit concept intuitively	139–140 160 162	2 Mixed ex. (no. 1)	53 56 61	6–1 (pp. 204–211)	260–263
7	Determine the average gradient of a function	141 160	3	53 56–57	6–2 (pp. 211–216)	263–265
8	Determine the gradient at a point/the derivative function $f'(x)$ from first principles (differentiation)	142–144 161	4	53–54 57–58	6–3 (pp. 216–220)	266–269

MATHS HANDBOOK AND STUDY GUIDE Week 3 #Supplement						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
9	Analyse findings from first principles to develop and apply the rules for differentiation; Understand alternative notations	145–148 161	5	54 58		
10	Apply the rules for differentiation cont.	149 162	Mixed ex. (no. 2)#	61	6–4 (pp. 221–224)	269–272
11	Find equations of tangents to graphs of functions	150–155 162	6	59–60	6–5 (pp. 224–228)	272–275
12	Determine stationary points, points of inflection and the double derivative relating to concavity	156–159 162	7	60–61	6–6 (pp. 229–230)	276–278
13	Sketch the graphs of cubic polynomial functions	165–172 183	1 (no. 1a–b)	63–64	6–7 (pp. 230–232)	278–282

MATHS HANDBOOK AND STUDY GUIDE Week 4 *Select						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
14	Sketch cubic functions cont.	183	1 (no. 1c–f)	65–66	6–8 (pp. 233–235)	282–284
15	Sketch cubic functions cont. (use *Everything Maths*)				6–9 (pp. 236–240)	284–286
16	Analyse cubic functions (graph interpretation)	173–179 183–184	2*	67–70	6–10 (pp. 241–245)	286–295
17	Calculate values from the graphs (graph interpretation cont.) including the derivative graph	180–182 184–186	Mixed ex.	70–72		
18	Solve practical problems concerning optimisation (maxima and minima)	188–191 202	1 (no. 1–3)	73–74	6–11 (pp. 245–251)	295–300

MATHS HANDBOOK AND STUDY GUIDE Week 5 #Supplement						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
19	Solve practical problems concerning optimisation cont.	192–194 202–203 205	1 (no. 4–6) Mixed ex. (no. 3,5,6)	75 77–78		
20	Solve practical problems concerning rates of change	195–198 204	2 Mixed ex. (no. 1–2)	75–77	6–12 (pp. 252–255)	300–303
21	Solve problems concerning the calculus of motion	199–201 204–205	3 Mixed ex. (no. 4)	76 78		172–180
22	**Trigonometry – compound angles:** **CAPS p. 42** Revise Grade 11 Trigonometry (excluding equations)	90–93 111	1#	33–35	4–1 (pp. 138–144)	
23	Introduce and derive compound angle identities	94–98 111–112	2	33 35–37		
Note: The proof of the identity $\cos(\alpha - \beta) = \cos\alpha\cos\beta + \sin\alpha\sin\beta$ is not examinable, but it should be explained. The other compound angle identities follow – the derivations of these are examinable (lesson 23).						

MATHS HANDBOOK AND STUDY GUIDE Week 6						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
24	Expand and simplify expressions involving compound angles (use *Everything Maths*)				4–2 (pp. 144–150)	180–186
25	Derive double angle identities	99–102 112	3	38–39		
26	Prove identities using double angle formulae (use *Everything Maths*)				4–3 (pp. 151–154)	186–191
27	Prove identities involving compound angle identities	103–105 112	4	39–41		
28	Revise Grade 11 trigonometric equations	106–107 113	5	42		

MATHS HANDBOOK AND STUDY GUIDE Week 7						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
29	Solve trigonometric equations using compound angle and double angle identities; Determine restrictions on identities and equations	108–110 113	6	43–44		
30	Simplify and evaluate trigonometric expressions, solve equations and prove identities	113–114	Mixed ex.	44–46	4–4 (pp. 154–160)	191–198
31	Solve trigonometric equations using compound angle and double angle identities (use *Everything Maths*)				4–7 (no. 11–14; 16) (pp. 173–174)	218–223
32	Draw and work with trigonometric graphs involving compound angle identities (use *Everything Maths*)					
33	**Formal assessment: Assignment** (use *Mixed Exercise*)	113–114	Mixed ex.	350–351		

MATHS HANDBOOK AND STUDY GUIDE Week 8						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
34	**Trigonometry: Solve problems in two and three dimensions: CAPS p. 44** Revise sine, cosine and area rules (two dimensions)	119–122 127	1	49	4–5 (pp. 161–164)	198–202
35	**Formal assessment: Investigation: Application of sine, cosine and application rules**	380	Inv.	132–133		
36	**Formal assessment: Investigation cont.**	380	Inv.	132–133		
37	Solve problems in three dimensions	123–125 127–128	2 (no. 1–3)	50	4–6 (pp. 165–170)	203–209
38	Solve problems in three dimensions (some involving compound angle identities)	126 128–129	2 (no. 4–7)	50–51		
Note: Learners should be familiar with the sine, cosine and area rules in preparation for the investigation (refer to lessons 35 and 36).						

MATHS HANDBOOK AND STUDY GUIDE Week 9						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
39	Solve problems in three dimensions (some involving compound angle identities) cont.	129–130	Mixed ex.	51–52		
40	Solve problems in three dimensions cont. (use *Everything Maths*)				4–7 (no. 17–22) (pp. 174–176) 224–230	224–230
41	**Analytical Geometry: CAPS p. 47** Revise analytical geometry done in previous grades	207–210 221	1	79–81	7–1, 7–2 (pp. 264–275)	326–342
42	Determine the equation of a circle with centre the origin and radius r and solve related problems (use *Everything Maths*)				7–3 (pp. 275–283)	342–351
43	Determine the equation of a circle with centre $(a; b)$ and radius r and solve related problems	211–213 222	2	81–82	7–4 (pp. 283–294)	351–360
Note: Review marked assignment when time allows – provide full solutions to learners.						

MATHS HANDBOOK AND STUDY GUIDE Week 10 #Supplement						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
44	Determine if two circles intersect	213–214 222	3	83		
45	Determine the equation of a tangent to a circle	215–220 222–223	4	83–85	7–5 (pp. 294–305)	360–368
46	Solve problems involving circles	223–224	Mixed ex. (no. 1–4)	85–87		
47	**Formal assessment: Test**					
48	Revise analytical geometry	224	Mixed ex. (no. 5–7)#	87–88	7–6 (pp. 307–309)	369–381

1.4 *Mind Action Series Mathematics*

MIND ACTION SERIES MATHEMATICS Week 1						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
1	**Functions: Polynomials CAPS p. 44** Discuss the definition of a polynomial (use *Everything Maths*)	147			5–1 (pp. 178–179)	232–234
2	Factorise two types of specific cubic polynomials; Use long division to divide a polynomial by a binomial	147–150	Rev. 1	145–147	5–3 (pp. 184–190)	238–246
3	Find the remainder using the Remainder Theorem; Determine the value of an unknown given the remainder	150–152	2	147–148	5–4 (pp. 191–194)	246–250

MIND ACTION SERIES MATHEMATICS Week 2 *Select						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
4	Factorise third-degree polynomials using the Factor Theorem; Determine the value of an unknown when the divisor is a factor	152–155	3	149–152	5–5 (pp. 195–198)	250–251
5	Solve third-degree polynomials using the Factor Theorem; Revise the Remainder and Factor Theorems	156–158	4 Rev.*	152–156	5–6 (pp. 199–201)	252–254
6	**Differential Calculus: CAPS pp. 45–46** Introduce and understand the limit concept intuitively	160–163	1	163–164	6–1 (pp. 204–211)	260–263
7	Determine the average gradient of a function	164–166	2	164–165		
8	Determine the derivative function $f'(x)$ from first principles (differentiation)	166–171	3 (no. 8a–h)	161 165–166	6–2 (pp. 211–216)	263–265

MIND ACTION SERIES MATHEMATICS Week 3						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
9	Determine the derivative function $f'(x)$ from first principles cont.	171	3 (no. 1i–n; 2–3)	166–169	6–3 (pp. 216–220)	266–269
10	Analyse findings from first principles to develop and apply the rules for differentiation; Understand alternative notations	171–175 177	4 (no. 1)	161–162 169–170	6–4 (pp. 221–224)	269–272
11	Apply the rules for differentiation cont.	176–178	4 (no. 2–4)	170–175	6–6 (pp. 229–230)	276–278
12	Determine stationary points and sketch the graphs of quadratic functions	179–181	5	176–178	6–7 (pp. 230–232)	278–282
13	Develop an understanding of concavity, points of inflection and the second derivative test; Sketch graphs of cubic functions	182–188	6 (no. 1a–d)	162 178–181	6–8 (pp. 233–235)	282–284

MIND ACTION SERIES MATHEMATICS Week 4 *Select						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
14	Sketch graphs of cubic functions cont.	188	6 (no. 1e–j; 2)	182–186	6–9 (pp. 236–240)	284–286
15	Determine the equation of a cubic function	189–191	7	187–189	6–10 (pp. 241–245)	286–295
16	Calculate values using the graph of the derivative of a function	191–194	8	189–190		
17	Find equations of tangents to graphs of functions; Calculate values using cubic functions and tangents (graph interpretation)	194–198	9*	162 190–194	6–5 6–6 (pp. 224–230)	272–278
18	**Formal assessment: Investigation: Calculus – optimisation**			Inv. 1–2 219–223 Memo. 224–228		

MIND ACTION SERIES MATHEMATICS Week 5 *Select						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
19	**Formal assessment: Investigation cont.**		Inv. 1–2 219–223 Memo. 224–228			
20	Solve practical problems concerning optimisation (apply differentiation in calculating maximum and minimum values)	198–203	10	163 195–198	6–11 (pp. 245–251)	295–300
21	Solve practical problems concerning optimisation cont.	204–206	11	198–202		
22	Solve practical problems involving functions; Solve problems concerning rates of change	206–210	12*–13	202–205	6–12 (pp. 252–255)	300–303
23	Solve practical problems concerning the calculus of motion	210–211	14	205–206		

MIND ACTION SERIES MATHEMATICS Week 6						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
24	**Trigonometry – compound angles: CAPS p. 42** Revise Grade 11 Trigonometry	110	Rev. (no. 1–4)	103–104	4–1 (pp. 138–144)	172–180
25	Revise Grade 11 Trigonometry cont.	110	Rev. (no. 5–8)	105–106		
26	Introduce and derive compound angle identities; Expand and simplify expressions involving compound angles	111–114	1	106–107	4–2 (pp. 144–150)	180–186
27	Prove identities and evaluate expressions involving compound angle identities	114–115	2	107–108		
28	Derive double angle identities; Prove identities, expand and simplify expressions using double angle formulae	115–118	3	108–111	4–3 (pp. 151–154)	186–191
Note: The proof of the identity $\cos(\alpha - \beta) = \cos\alpha\cos\beta + \sin\alpha\sin\beta$ is not examinable, but it should be explained. The other compound angle identities follow – the derivations of these are examinable (lesson 26).						

MIND ACTION SERIES MATHEMATICS Week 7 *Select						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
29	Evaluate expressions involving double angle formulae	119	4	111–112		
30	Solve compound and double angle identities involving the theorem of Pythagoras	120–123	5	113–116		
31	Prove identities using compound and double angle formulae	124–126	6	116–118		
32	Solve trigonometric equations using compound angle and double angle identities	126–129	7	118–122	4–4 (pp. 154–160)	191–198
33	Solve trigonometric equations; Determine the values for which identities are undefined	130–132	8–9*	122–124		

MIND ACTION SERIES MATHEMATICS Week 8 *Select						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
34	Draw and work with trigonometric graphs involving compound angle identities	133–137	10*–11	125–131	4–7 (no. 11–14; 16) (pp. 173–174)	218–223
35	**Formal assessment: Assignment: Trigonometry** (use *Revision ex.* – select questions)	144–145	Rev.*	137–142		
36	**Trigonometry: Solve problems in two and three dimensions: CAPS p. 44** Revise sine, cosine and area rules (two dimensions) (use *Everything Maths*)				4–5 (pp. 161–164)	198–202
37	Solve problems in three dimensions involving numerical values	137–140	12 (no. 1–4)	131–133	4–6 (pp. 165–170)	203–209
38	Solve problems in three dimensions involving numerical values cont.	140–141	12 (no. 5–8)	133–134		

MIND ACTION SERIES MATHEMATICS Week 9						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
39	Solve problems in three dimensions involving variables	141–143	13	135–137		
40	Solve problems in three dimensions cont. (use *Everything Maths*)				4–7 (no. 17–22) (pp. 174–176)	224–230
41	**Analytical Geometry: CAPS p. 47** Revise analytical geometry done in previous grades	217–218	Rev. ex.	229–231	7–1, 7–2 (pp. 264–275)	326–342
42	Determine the equation of a circle with centre the origin and radius r and solve related problems	218–221	1	232–233	7–3 (pp. 275–283)	342–351
43	Determine the equation of a circle with centre $(a; b)$ and radius r and solve related problems	221–223	2	233–235	7–4 (pp. 283–294)	342–351
Note: The *Trig. Revision Exercise* (LB pp. 144–145; TG pp. 137–142) should be done at home for consolidation. Review marked assignment when time allows – provide full solutions to learners.						

MIND ACTION SERIES MATHEMATICS Week 10						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
44	Determine the equation of a tangent to a circle	224–228	3 (no. 1–3)	236–238	7–5 (pp. 294–305)	360–368
45	Solve problems involving tangents and circles	228–229	3 (no. 4–6)	238–239		
46	Revise analytical geometry	229–230	Rev. ex.	240–243		
47	**Formal assessment: Test**					
48	Revise analytical geometry	231–232	Some challenges	243–245	7–6 (pp. 307–309)	369–381
Note: Analytical Geometry: For circles which touch/do not touch/intersect, see note in *Everything Maths* LB p. 292.						

1.5 *Platinum Mathematics*

PLATINUM MATHEMATICS Week 1 *Select						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
1	**Functions: Polynomials CAPS p. 44** Discuss the definition of a polynomial (use *Everything Maths* for ex.); Function notation	132–134	1*	103–104	5–1 (pp. 178–179)	232–234
2	Factorise two types of specific cubic polynomials; Divide polynomials by binomials using long division (use *Everything Maths*)	134	2*	104	5–3 (pp. 184–190)	238–246
3	Find the remainder using the Remainder or the Factor Theorems; Determine the value of an unknown given the remainder	135–136	3	105–107	5–4 (pp. 191–194)	246–250

PLATINUM MATHEMATICS Week 2 *Select						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
4	Factorise third-degree polynomials using the Factor Theorem	136–138	4*	107–108	5–5 (pp. 195–198)	250–251
5	Solve third-degree polynomials using the Factor Theorem	138–139	5	108–109	5–6 (pp. 199–201)	252–254
6	**Differential Calculus: CAPS pp. 45–46** Introduce and understand the limit concept intuitively	142–143	1	113–116	6–1 (pp. 204–211)	260–263
7	Determine the average gradient of a function	144–149	2–3*	117–120		
9	Use limits to define the derivative of a function; Determine the derivative function $f'(x)$ from first principles (differentiation)	150–153	4	121–122	6–2 (pp. 211–216)	263–265

PLATINUM MATHEMATICS Week 3 *Select						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
9	Determine the derivative function $f'(x)$ from first principles cont.	153	5	122–124	6–3 (pp. 216–220)	266–269
10	Analyse findings from first principles to develop and apply the rules for differentiation; Understand alternative notations	154–155	6 (no. 1–12)	125–126	6–4 (pp. 221–224)	269–272
11	Apply the rules for differentiation cont.	155–157	6 (no. 13–28) 7*	127–128		
12	Find equations of tangents to graphs of functions	158–161	8–9*	129–133	6–5 (pp. 224–228)	272–275
13	Determine and analyse the second derivative, stationary points, points of inflection and concavity	162–166	10*	133–137	6–6 (pp. 229–230)	276–278

PLATINUM MATHEMATICS Week 4 *Select						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
14	Sketch graphs of cubic functions	167–170	11 (no. 1–6)	138–140	6–7 (pp. 230–232)	278–282
15	Sketch cubic functions cont.	170	11 (no. 7–20)*	140–145	6–8 (pp. 233–235)	282–284
16	Sketch cubic functions with the derivative graphs and analyse their relationships	170	12*	145–158	6–9 (pp. 236–240)	284–286
17	Calculate values from the graphs (graph interpretation) including the derivative graph	171–174	13 (no. 1–5)	159	6–10 (pp. 241–245)	286–295
18	Calculate values (graph interpretation) cont.	175	13 (no. 6–10)	159–162		

PLATINUM MATHEMATICS Week 5						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
19	Solve practical problems concerning optimisation (maxima and minima)	177–179	14 (no. 1–4)	163–164	6–11 (pp. 245–251)	295–300
20	Solve practical problems concerning optimisation cont.	180–183	14 (6–10)	164–165		
21	Solve practical problems concerning rates of change (use *Everything Maths*)				6–12 (pp. 252–255)	300–303
22	Solve problems concerning the calculus of motion	176 182 186	14 (no. 5) Rev. test (no. 18–19)	164 170		
23	**Formal assessment: Investigation: Find maximum area of polygons with a fixed perimeter**	111–113	Inv.	80–86		

PLATINUM MATHEMATICS Week 6						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
25	**Formal assessment: Investigation cont.**	111–113	Inv.	80–86		
25	**Trigonometry – compound angles: CAPS p. 42** Revise Grade 11 Trigonometry	90–91	1 (no. 1–5)	56	4–1 (no. 1–7) (pp. 138–143)	172–177
26	Revise Grade 11 Trigonometry cont.	91	1 (no. 6–8)	57	4–1 (no. 8–10) (p. 144)	177–180
27	Introduce and derive compound angle identities; Expand and simplify expressions involving compound angles	92–95	2 (no. 1–2)	58	4–2 (pp. 144–150)	180–186
28	Prove identities and evaluate expressions involving compound angle identities	95	2 (no. 3–5)	58–61		
Note: The proof of the identity $\cos(\alpha - \beta) = \cos\alpha\cos\beta + \sin\alpha\sin\beta$ is not examinable, but it should be explained. The other compound angle identities follow – the derivations of these are examinable (lesson 27).						

PLATINUM MATHEMATICS Week 7 *Select						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
29	Derive double angle identities; Expand and evaluate expressions involving double angles	96–98	3 (no. 1–2)	61–62	4–3 (pp. 151–154)	186–191
30	Prove identities and evaluate expressions using double angle formulae	98	3 (no. 3–6)	62–63		
31	Prove identities using the compound angle and double angle identities	101–102	5 (no. 1)	65–66		
32	Prove identities using the compound angle and double angle identities	102	5 (no. 2)	66–67		
33	Solve trigonometric equations using compound angle and double angle identities	103–107	6*–7*	68–70		

PLATINUM MATHEMATICS Week 8 *Select						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
34	Solve trigonometric equations using compound angle and double angle identities cont.	107–108	8	70–72	4–4 (pp. 154–160)	191–198
35	Draw and work with trigonometric graphs involving compound angle identities (use *Everything Maths*)				4–7 (no. 11–14; 16) (pp. 173–174)	218–223
36	**Formal assessment: Assignment** (use *Trig. revision test* – select questions)	109–110	Rev. Test*	72–79		
37	**Trigonometry: Solve problems in two and three dimensions: CAPS p. 44** Revise sine, cosine and area rules (two dimensions)	120–122	1	90–92	4–5 (pp. 161–164)	198–202
38	Prove identities using the sine, cosine and area rules	123	2	92–94		
Note: Trigonometry: The remainder of the questions from the *Revision Test Topic 5* (LB pp. 109–110; TG pp. 72–79) should be done at home for consolidation (refer to lesson 36).						

PLATINUM MATHEMATICS Week 9						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
39	Solve problems in three dimensions involving numerical values	125–126	3 (no. 1–3)	95	4–6 (pp. 165–170)	203–209
40	Solve problems in three dimensions involving numerical values cont.	127	3 (no. 4–7)	95–96		
41	Solve problems in three dimensions involving variables and compound angle identities	128–129	4	97–99	4–7 (no. 17–22) (pp. 174–176)	224–230
42	**Analytical Geometry: CAPS p. 47** Revise analytical geometry done in previous grades (use *Everything Maths*)			172	7–1, 7–2 (pp. 264–275)	326–342
43	Determine the equation of a circle with centre the origin and radius *r* and solve related problems (use *Everything Maths*)				7–3 (pp. 275–283)	342–351
Note: Review marked assignment when time allows – provide full solutions to learners.						

PLATINUM MATHEMATICS Week 10 *Select						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
44	Determine the equation of a circle with centre $(a; b)$ and radius r and solve related problems.	188–192	1	173–174	7–4 (pp. 283–294)	351–360
45	Determine the equation of a tangent to a circle	193–196	2 (no. 1–2)	175–176	7–5 (pp. 294–305)	360–368
46	Solve problems involving tangents and circles; Revise analytical geometry	197–199	2 (no. 3–6) Rev. Test (no. 1–9)*	176–179		
47	**Formal assessment: Test**					
48	Revise analytical geometry	200–201	Rev. Test (no. 10–18)*	179–181	7–6 (pp. 307–309)	369–381
Note: Analytical Geometry: For circles which touch/do not touch/intersect, see note in *Everything Maths* LB p. 292.						

1.6 *Siyavula Everything Maths*

SIYAVULA EVERYTHING MATHS Week 1 *Select				
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**
1	**Functions: Polynomials CAPS p. 44** Discuss the definition of a polynomial; Revise factorising quadratics	178–184	5-1–5-2*	232–238
2	Revise factorisation of specific cubics; Use long division to divide a polynomial by a binomial	184–190	5–3	238–246
3	Find the remainder using the Remainder Theorem; Determine the value of an unknown given the remainder	191–194	5–4	246–250

SIYAVULA EVERYTHING MATHS Week 2				
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**
4	Factorise third-degree polynomials using the Factor Theorem; Determine the value of an unknown when the divisor is a factor	195–198	5–5	250–251
5	Solve third-degree polynomial equations using the Factor Theorem	199–201	5–6	252–254
6	**Differential Calculus: CAPS pp. 45–46** Introduce and understand the limit concept intuitively	204–211	6–1	260–263
7	Revise concept of average gradient and investigate the gradient of a curve at a point	211–216	6–2	263–265
8	Determine the derivative function $f'(x)$ from first principles (differentiation)	216–220	6–3	266–269

SIYAVULA EVERYTHING MATHS Week 3				
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**
9	Analyse findings from first principles to develop and apply the rules for differentiation; Understand alternative notations	221–223	6–4 (no. 1)	269–270
10	Apply the rules for differentiation cont.	224	6–4 (no. 2–11)	270–272
11	Find equations of tangents to graphs of functions	224–228	6–5	272–275
12	Introduce the second derivative	229–230	6–6	276–278
13	Determine intercepts and roughly sketch the graphs of cubic polynomial functions	230–232	6–7	278–282

SIYAVULA EVERYTHING MATHS Week 4				
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**
14	Determine the stationary points of cubic functions	233–235	6–8	282–284
15	Develop an understanding of concavity, points of inflection and the second derivative test; Sketch cubic functions	236–240 257–259	6–9 6–13 (no. 11,12,17)	284–286 308–312 315–318
16	Interpret graphs including derivative graphs	241–244	6–10 (no. 1–5)	286–292
17	Interpret graphs cont.	244–245	6–10 (no. 6–9)	292–295
18	**Formal assessment: Investigation – source own**			
Note: Refer to lesson 15: The sketching of cubic functions needs more practice – source more cubic graphs. Refer to lessons 18 and 19: There is no investigation relating to the topics for this term, so an investigation may be sourced from another set of LTSMs. One example may be an investigation relating to optimisation (maxima and minima).				

SIYAVULA EVERYTHING MATHS Week 5 *Select				
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**
19	**Formal assessment: Investigation cont.**			
20	Solve practical problems concerning optimisation (maxima and minima)	245–251	6–11 (no. 1–4)	295–298
21	Solve practical problems concerning optimisation cont.	251	6–11 (no. 5–6)	299–300
22	Solve practical problems concerning rates of change and the calculus of motion	252–255	6–12	300–303
23	Revise Differential Calculus	257–258	6–13 (no. 1–12)*	304–312

SIYAVULA EVERYTHING MATHS Week 6 *Select				
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**
26	Revise Differential Calculus cont.	258–261	6–13 (no. 13–25)*	312–323
25	**Trigonometry – compound angles: CAPS p. 42** Revise Trigonometry – reduction formulae, co-functions and identities	138–143	4–1 (no. 1–7)	172–177
26	Revise Trigonometry – reduction formulae, co-functions and identities cont.	144	4.1 (no. 8–10)	177–180
27	Introduce and derive compound angle identities; Expand and simplify expressions involving compound angles	144–150	4–2 (no. 1–2)	180–184
28	Prove identities involving compound angle identities	150	4–2 (no. 3–7)	184–186
Note: The proof of the identity $\cos(\alpha - \beta) = \cos\alpha\cos\beta + \sin\alpha\sin\beta$ is not examinable, but it should be explained. The other compound angle identities follow – the derivations of these are examinable (lesson 27).				

SIYAVULA EVERYTHING MATHS Week 7				
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**
29	Derive double angle identities; Prove identities using double angle formulae	151–154	4–3	186–191
30	Solve trigonometric equations using compound angle and double angle identities	154–160	4–4 (no. 1)	191–194
31	Solve trigonometric equations using compound angle and double angle identities cont.	154–160	4–4 (no. 2–8)	194–198
32	Revise Trigonometry involving compound and double angles	172–173	4–7 (no. 1–6)	209–213
33	Draw and work with trigonometric graphs involving compound angle identities	173–174	4–7 (no. 11–14, 16)	218–223

SIYAVULA EVERYTHING MATHS Week 8				
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**
34	**Formal assessment: Assignment: Trigonometry** (use *end of chapter exercises*)	173	4–7 (no. 7–10)	213–218
35	**Trigonometry: Solve problems in two and three dimensions: CAPS p. 44** Revise sine, cosine and area rules (two dimensions)	161–164	4–5	198–202
36	Solve problems in three dimensions	165–169	4–6 (no. 1–3)	203–209
37	Solve problems in three dimensions cont.	169–170	4–6 (no. 4–6)	
38	Solve problems in three dimensions involving compound angle identities	174–176	4–7 (no. 17–22)	224–230

SIYAVULA EVERYTHING MATHS Week 9				
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**
39	**Analytical Geometry: CAPS p. 47** Revise straight line equations	264–268	7–1	326–332
40	Revise the inclination of a line, parallel and perpendicular lines	269–275	7–2	332–342
41	Determine the equation of a circle with centre the origin and radius r and solve related problems	275–282	7–3 (no. 1–3)	342–347
42	Determine the equation of a circle with centre the origin and radius r and solve related problems cont.	282–283	7–3 (no. 4–7)	347–351
43	Determine the equation of a circle with centre $(a; b)$ and radius r and solve related problems	283–293	7–4 (no. 1–3)	351–354
Note: Review marked assignment when time allows – provide full solutions to learners.				

SIYAVULA EVERYTHING MATHS Week 10 *Select				
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**
44	Determine the equation of a circle with centre $(a; b)$ and radius r and solve related problems cont.	293–294	7–4 (no. 4–10)	354–360
45	Determine the equation of a tangent to a circle	294–304	7–5 (no. 1–2)	360–362
46	Solve problems involving tangents and circles	304–305	7–5 (no. 3–8)	362–368
47	**Formal assessment: Test**			
48	Revise analytical geometry	305–309	7–6*	369–381

1.7 *Via Afrika Mathematics*

VIA AFRIKA MATHEMATICS Week 1 *Select						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
1	**Functions: Polynomials CAPS p. 44** Discuss the definition of a polynomial (use *Everything Maths*); Revise factorising different types of polynomials	156–157	Questions *	191–193	5–1 (pp. 178–179)	232–234
2	Use long division to divide a polynomial by a binomial (use *Everything Maths*)				5–3 (pp. 184–190)	238–246
3	Find the remainder using the Remainder Theorem; Determine the value of an unknown given the remainder	158–159	1	194–196	5–4 (pp. 191–194)	246–250

VIA AFRIKA MATHEMATICS Week 2 *Select						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
4	Factorise third-degree polynomials using the Factor Theorem; Determine the value of an unknown when the divisor is a factor	160–163	2–3* (not no. 5)	197–202	5–5 (pp. 195–198)	250–251
5	Solve third-degree polynomials using the Factor Theorem	160–162	3 (no. 5)	199–200	5–6 (pp. 199–201)	252–254
6	**Differential Calculus: CAPS pp. 45–46** Revise $f(x)$notation, average gradient, the parabola and the straight line	166–169	Questions*	207–210		
7	Investigate and understand the limit concept intuitively	170–171	1–2	211–213	6–1 (pp. 204–211)	260–263
8	Determine the average gradient of a graph; Introduce the gradient of a curve at a point	172–175	3–4*	214–220	6–2 (pp. 211–216)	263–265
Note: Refer to lesson 4. Leave out the examples under The Factor Theorem which involve solving cubic polynomials. These should be done in lesson 5.						

VIA AFRIKA MATHEMATICS Week 3 *Select						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
9	Determine the derivative function $f'(x)$ from first principles (differentiation)	176–178	5 (no. 1–3*)	221–224	6–3 (pp. 216–220)	266–269
10	Determine the derivative function $f'(x)$ from first principles cont.	178	5 (no. 4–5)	224		
11	Analyse findings from first principles to develop and apply the rules for differentiation; Understand alternative notations	178–179	6 (no. 1–16)	225	6–4 (pp. 221–224)	269–272
12	Apply the rules for differentiation cont.; Determine the derivative at a point	178–181	6 (no. 17–22) 7–8*	225–226	6–6 (pp. 229–230)	276–278
13	Find equations of tangents to graphs of functions	182–183	9*	227–230	6–5 (pp. 224–228)	272–275

VIA AFRIKA MATHEMATICS Week 4						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
14	Investigate and sketch the graphs of cubic polynomial functions	184–185	10–11 (no. 1–4)	231–234	6–7, 6–8 (pp. 230–235)	278–286
15	Sketch cubic functions cont.	185	11 (no. 5–12)	234–236	6–9 (pp. 236–240)	284–286
16	Calculate values from the graphs (graph interpretation) including the derivative graph	185–187	11 (no. 13–17)	236–237	6–10 (pp. 241–245)	286–295
17	Develop an understanding of concavity, points of inflection and the second derivative test; Calculate values from the graphs (graph interpretation) cont.	188–191	1	238–242		
18	**Formal assessment: Investigation – source own**					
Note: Refer to lessons 18 and 19: There is no investigation relating to the topics for this term, so an investigation may be sourced from another set of LTSMs. One example may be an investigation relating to optimisation (maxima and minima).						

VIA AFRIKA MATHEMATICS Week 5						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
19	**Formal assessment: Investigation cont.**					
20	Solve practical problems concerning optimisation (maxima and minima) and the calculus of motion	192–194	13 (no. 1–7)	243–245	6–11 (pp. 245–251)	295–300
21	Solve practical problems concerning optimisation cont.	195–196	13 (no. 8–13)	245–246		
22	Solve practical problems concerning optimisation cont.	196–197	13 (no. 14–19)	246–247		
23	Solve practical problems concerning rates of change (use *Everything Maths*)				6–12 (pp. 252–255)	300–303

VIA AFRIKA MATHEMATICS Week 6 *Select						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
24	**Trigonometry – compound angles: CAPS p. 42** Revise Grade 11 Trigonometry	102–106	Questions (no. 1–4)	124–125	4–1 (no. 1–7) (pp. 138–143)	172–177
25	Revise Grade 11 Trigonometry cont.	106–107	Questions (no. 5–14)	125–127	4–1 (no. 8–10) (p. 144)	177–180
26	Introduce and derive compound angle identities; Expand and simplify expressions involving compound angles	108–115	1 (no. 1–3) 2 (no. 1–2; 5)	128–133	4–2 (pp. 144–150)	180–186
27	Evaluate expressions and prove identities involving compound angles	111–115	1 (no. 4–8) 2 (no. 3–4; 6–17)*	130–134		
29	Derive double angle identities; Evaluate expressions using double angle formulae	116–119	3 (no. 1–5)	135–137	4–3 (pp. 151–154)	186–191
Note: The proof of the identity $\cos(\alpha - \beta) = \cos\alpha\cos\beta + \sin\alpha\sin\beta$ is not examinable, but it should be explained. The other compound angle identities follow – the derivations of these are examinable (lesson 26).						

VIA AFRIKA MATHEMATICS Week 7						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
29	Evaluate and simplify expressions using double angle formulae	119	3 (no. 6–12)	138		
30	Prove identities using compound and double angle formulae	120–123	4 (no. 1)	139–140		
31	Prove identities using compound and double angle formulae cont.	123	4 (no. 2–5)	141–142		
32	Solve trigonometric equations using compound angle and double angle identities	124–127	5 (no. 1)	143–146		
33	Solve trigonometric equations using compound angle and double angle identities cont.	127	5 (no. 2–6)	146	4–4 (pp. 154–160)	191–198

VIA AFRIKA MATHEMATICS Week 8						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
34	Draw and work with trigonometric graphs involving compound angles	128–130	6	147–150	4–7 (no. 11–14; 16) (pp. 173–174)	218–223
35	**Formal assessment: Assignment: Compound angles**	131	Ass.	150–152		
36	**Trigonometry: Solve problems in two and three dimensions: CAPS p. 44** Revise sine, cosine and area rules (two dimensions)	142–145	Questions	177–179	4–5 (pp. 161–164)	198–202
37	Solve problems in three dimensions	146–149	1 (no. 1–2)	180–182	4–6 (pp. 165–170)	203–209
38	Solve problems in three dimensions cont.	149	1 (no. 3–6)	182		
Note: The revision exercise on Trigonometry (LB pp. 132–133; TG pp. 153–156) should be done at home for consolidation.						

VIA AFRIKA MATHEMATICS Week 9 *Select						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
39	Solve problems in three dimensions involving compound angle identities	150–152	2 (no. 1–4)	183–185	4–7 (no. 17–22) (pp. 174–176)	224–230
40	Solve problems in three dimensions involving compound angle identities cont.	152–153	2 (no. 5–10)	185–187		
41	**Analytical Geometry: CAPS p. 47** Revise analytical geometry done in previous grades	202–203	Questions *	253–258	7–1, 7–2 (pp. 264–275)	326–342
42	Determine the equation of a circle with centre the origin and radius r and solve related problems	204–207	1*	259–262	7–3 (pp. 275–283)	342–351
43	Determine the equation of a circle with centre $(a; b)$ and radius r and solve related problems	208–211	2–4 *	263–267	7–4 (pp. 283–294)	351–360
Note: Review marked assignment when time allows – provide full solutions to learners.						

VIA AFRIKA MATHEMATICS Week 10 *Select						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
44	Determine the equation of a circle with centre $(a; b)$ and radius r and solve related problems cont.	211–213	5	267–269		
45	Determine the equation of a tangent to a circle	214–216	6*–7 (no. 1–5)	270–274	7–5 (pp. 294–305)	360–368
46	Solve problems involving tangents and circles	216–217	7 (no. 6–10)	274–275		
47	**Formal assessment: Test**					
48	Revise analytical geometry	218–219	Questions *	276–278	7–6 (pp. 307–309)	369–381

2. PLANNERS FOR TERM 2

2.1 *Classroom Mathematics*

CLASSROOM MATHEMATICS Week 1						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
1	**Euclidean Geometry: CAPS p. 48** Revise Grade 11 circle geometry theory; Calculate and investigate ratios involving the properties of the areas of triangles	279–283	11.1	391–392	8-1–8-2 (pp. 312–322)	384–395
2	Prove the theorem◊ which states that a line drawn parallel to one side of a triangle divides the other two sides proportionally (and the Mid-point Theorem as a special case of this theorem)	284–288	11.2	393–395	8-3–8-5 (pp. 323–334)	395–406
3	Revise earlier work on the necessary and sufficient conditions for polygons to be similar; Prove the theorem◊ (and the converse) which states that equiangular triangles are similar; Discuss Examples 1–2	288–292; 295–296	11.3 (no. 1)	396	8–6 (pp. 334–337)	407–408
4	Solve riders involving similar triangles; Discuss Examples 4–5	293–294	11.3 (no. 2–4)	397–398	8–7 (pp. 337–341)	408–411
Note: ◊ Proof of this theorem must be known for examination purposes but not the proof of the converse.						

CLASSROOM MATHEMATICS Week 2						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
5	Prove the Pythagorean Theorem by similar triangles◊; Solve numerical problems involving this theorem	297–298	11.4	398–400	8–9 (pp. 348–352)	414–417
6	Solve numerical problems and riders involving the above theorems	299–300	11.5	400–404		
7	Solve basic riders involving these theorems	301–302	11.6 (no. 1–5)	404–407		
8	Solve basic riders cont.	303–304	11.6 (no. 6–11)	407–410	8–10 (no. 1–5) (pp. 353–356)	417–420
9	Solve more complex riders	304–307	11.7 (no. 1–5)	410–414	8–10 (no. 6–10) (pp. 356–357)	420–424
Notes: 1. ◊ Proof of this theorem must be known for examination purposes but not the proof of the converse. 2. Refer to Lesson 9: Discuss Examples 1 and 2 thoroughly with learners as the level becomes more difficult. If learners are finding these riders too difficult, it may be necessary for riders to be solved as a whole class discussion or in small groups.						

CLASSROOM MATHEMATICS Week 3 *Select						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
10	Solve more complex riders cont.	307–308	11.7 (no. 6–10)	414–418	8–10 (no. 11–14) (pp. 357–358)	424–428
11	Discuss and prove the converses of the Proportional Division Theorem, the Mid-point Theorem and the Theorem of Pythagoras (*the proofs are not examinable*); Solve problems involving these converses	309–312	11.8	419–420	8–8 (pp. 341–348)	411–414
12	**Patterns, Sequences and Series: CAPS p. 40** Revise number patterns	1–2	1.1	35–37	1–3 (pp. 9–12)	34–37
13	Sequences: Extend the pattern and generate terms	3–5	1.2	38–39		
14	Arithmetic sequences: Derive and apply the general term to solving problems (*Examples 1–2*)	5–8	1.3 (no. 1–3*, 6–7)	39–41 43–44	1–1 (p. 4)	26–28
Notes: 1. Refer to Lesson 10: If learners are finding these riders too difficult, it may be necessary for riders to be solved as a whole class discussion or in small groups. 2. From Lesson 12 onwards, for consolidation, one problem per day may be chosen for learners to do at home (with the solution done in class on the subsequent day) from Exercise 11.9 *(Check your skills)* (LB pp. 313–314; TG pp. 421–426) and/or from Exercise 11.10 *(Extend your skills)* (LB pp. 315–316; TG pp. 427–432).						

CLASSROOM MATHEMATICS Week 4 *Select						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
15	**Formal assessment: Test option 1: Euclidean geometry**					
16	Solve arithmetic sequences problems (*Examples 3–4)*	6–8	1.3 (no. 4–5*, 8–9)	41–44	1–2 (pp. 5–9)	28–33
17	Geometric sequences: Derive and apply the general term to solving problems (*Examples1–2*)	9–12	1.4 (no. 1–5)*	45–46	1–4 (pp. 13–14)	37–38
18	Solve geometric sequences problems (*Examples 3–4*)	10–12	1.4 (no. 6–10)*	46–49	1-5–1-6 (pp. 15–18)	39–45
19	Series: Derive and apply the formula for the sum of an arithmetic sequence (*use Ex. 1.5 no. 1a-b as examples; Example 2)*	13–15	1.5 (no. 1–7)	50–51	1–8 (pp. 24–30)	48–55
Note: Refer to Lesson 19: The proof of the sum of an arithmetic series must be known for examination purposes.						

CLASSROOM MATHEMATICS Week 5 *Select						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
20	Solve problems related to arithmetic series (*Example 3)*	14–15	1.5 (no. 8–16)	52–54		
21	Series: Derive and apply the formula for the sum of a geometric sequence	16–19	1.6 (no. 1–4)	54–55	1–9 (pp. 30–35)	56–59
22	Solve problems related to geometric series	20	1.6 (no. 5–10)	55–57		
23	Sigma notation: Expand, evaluate and write series in sigma notation; Solve problems	21–23	1.7*	57–62	1–7 (pp. 19–23)	46–48
24	Investigate convergent and divergent series; Derive and apply the formula for the sum to infinity of a geometric series (*Example 1*)	24–31	1.8 1.9 (no. 1)	62–63 63–64	1–10 (pp. 36–38)	59–62
Note: Refer to Lesson 21: The proof of the sum of a geometric series must be known for exam purposes.						

CLASSROOM MATHEMATICS Week 6 * Select #Supplement						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
25	Solve problems related to the sum to infinity of a geometric series	30–31	1.9 (no. 2–13)*	64–68	1–11 (pp. 38–42)	62–66
26	**Functions and Inverse Functions: CAPS p. 40** Revise the parabola, the straight line and the exponential function (use *Everything Maths*)				2–1 (pp. 48–53)	84–89
27	Define *function*; Analyse relations and different functions; Determine the domain and range	37–43	2.1 (no. 1)#	86	2–2 (pp. 53–55)	89–92
28	Analyse relations and different functions cont.; Determine the domain and range cont.	43	2.1 (no. 2–4)	86–87		
29	Define *the inverse of a function*; Determine the inverse and how the domain of a function may be restricted; Sketch graphs	44–47	2.2 (no. 1)#	88–89	2–3 (pp. 56–61)	92–95
Note:	Refer to Lesson 25: The revision exercise *Check your skills:* Exercise 1.10 (LB pp. 33–34; TG pp. 68–73) for consolidation and *Extend your skills:* Exercise 1.11 (LB pp. 35–36; TG pp. 73–77) for enrichment (optional) should be done by learners at home. Full solutions for learners can be photocopied from the Teacher's Guide.					

CLASSROOM MATHEMATICS Week 7 #Supplement						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
30	Determine the inverse and how the domain of a function may be restricted cont.; Sketch graphs cont.	47	2.2 (no. 2–3)#	89–90	2–4 (no. 1–2) (pp. 61–66)	96–98
31	Sketch functions and inverses; Restrict domains	48–51	2.3 (no. 1–2)#	90–92	2–4 (no. 3–5) (pp. 66–67)	98–101
32	Sketch functions and inverses; Restrict domains; Review investigation done in previous week	51	2.3 (no. 3–5)#	91–92	2–5 (pp. 67–70)	101–106
33	Revise functions and inverse functions	52–53	2.4	93–94		
34	Revise functions and inverse functions cont.	54	2.5	94		

CLASSROOM MATHEMATICS Week 8 *Select						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
35	**Exponential and Logarithmic Functions: CAPS p. 41** Revise exponents; Revise exponential functions and their graphs	55–60	3.1 3.2 (no. 1–3)	98–101		
36	Revise exponential functions and their graphs	60–61	3.2 (no. 4–8)	101–103		
37	Understand the definition of a logarithm; Solve simple logarithmic equations	61–65	3.3–3.4	104–106	2–6 (pp. 70–74)	106–107
38	Evaluate and expand expressions using the laws of logarithms *(not examinable)*; Use logarithms to solve exponential equations	65–71	3.5* 3.6*	106–113	2-7–2-9 (pp. 74–82) 2.11 (pp. 88–89)	108–114 116–117
39	Determine and sketch the graph of the logarithmic function	71–77 79	3.7* 3.8 (no. 6–7)	114–117 120	2–10 (pp. 82–88)	114–116
Note: The application of the laws of logarithms in Exercise 3.5 (Lesson 38) is optional.						

CLASSROOM MATHEMATICS Week 9: Catch up, consolidation and revision – plan your week						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
40	**Formal assessment: Test option 2: Algebra** (optional – depending on time constraints)					
41						
42						
43						
44						
Note: Revise examination type questions on all Terms 1 and 2 topics during this week. These may be chosen from the revision exercises, various tasks or past papers.						

CLASSROOM MATHEMATICS Week 10: Mid-year examinations

2.2 *Clever: Keeping Maths Simple*

CLEVER: KEEPING MATHS SIMPLE Week 1						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
1	**Euclidean Geometry: CAPS p. 48** Revise similarity of polygons; Revise Grade 11 circle geometry theory; Discuss ratio and proportion	265–272	–	249–250	8-1–8-2 (pp. 312–322)	384–395
2	Prove the theorem◊ (and converse) which states that a line drawn parallel to one side of a triangle divides the other two sides proportionally; Solve numerical problems involving this theorem *(First discuss Examples 1–3)*	272–278	11.1 (no. 1–2)	251	8-3–8-4 (pp. 323–330)	395–403
3	Solve numerical problems and riders involving this theorem	278–282	11.1 (no. 3–4)	251–252	8–5 (pp. 330–334)	404–406
4	Solve more complex riders involving proportionality *(First discuss Example 4)*	276 281–282	11.2	252–253		
Note: ◊ Proof of this theorem must be known for examination purposes but not the proof of the converse.						

CLEVER: KEEPING MATHS SIMPLE Week 2 *Select						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
5	Prove the theorem◊ (and the converse) which states that equiangular triangles are similar; Discuss Examples 1–3; Solve numerical problems	282–288; 289–291	11.3 (no. 1–3)	254–255	8–6 (pp. 334–337)	407–408
6	Solve numerical problems and riders involving similarity	291–294	11.3 (no. 4–15)*	255–258	8–7 (pp. 337–341)	408–411
7	Solve more complex riders involving similarity and circles *(First discuss Example 4)*	288–289 294–295	11.4 (no. 1–4)	258–259	8–8 (pp. 341–348)	411–414
8	Solve more complex riders cont.	296–297	11.4 (no. 5–8)	259–260		
9	Prove the Pythagorean Theorem (and the converse) by similar triangles◊; Solve numerical problems and riders involving this theorem	297–304	11.5	260–261	8–9 (pp. 348–352)	414–417
Note: ◊ Proof of this theorem must be known for examination purposes but not the proof of the converse.						

CLEVER: KEEPING MATHS SIMPLE Week 3						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
10	Solve numerical problems and more complex riders involving the above theorems	305–308	Rev. ex. (no. 1–7)	262–264	8–10 (no. 1–7) (pp. 353–356)	417–422
11	Solve more complex riders cont.	308–311	Rev. ex. (no. 8–16)	264–267	8–10 (no. 8–14) (pp. 356–358)	422–428
12	**Patterns, Sequences and Series: CAPS p. 40** Identify different types of sequences (progressions): Extend the pattern and generate terms	1–3	1.1	1–3	1–3 (pp. 9–12)	34–37
13	Arithmetic and geometric sequences: Derive and apply the general term to solving problems	4–6	1.3	3–4	1-1–1-2 (pp. 4–9)	26–33
14	Compare arithmetic and geometric sequences and solve questions	7–9	1.4 (no. 1–6)	4	1-4–1-5 (pp. 13–15)	37–40
Notes: 1. See *Tips for solving geometry problems* in LB (p. 304). 2. Refer to Lessons 10 and 11: If learners are finding these riders too difficult, it may be necessary for riders to be solved as a whole class discussion or in small groups. 3. If the Revision exercise is not finished, then from Lesson 12 onwards, one rider per day may be chosen from this exercise for learners to do at home (with the solution done in class on the subsequent day).						

CLEVER: KEEPING MATHS SIMPLE Week 4 *Select						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
15	**Formal assessment: Test option 1: Euclidean geometry**					
16	Compare arithmetic and geometric sequences and solve questions cont.	10	1.4 (no. 8–15)	4–5	1–6 (pp. 16–18)	40–45
17	Derive and apply the arithmetic and geometric mean; Expand, evaluate and write series in sigma notation	10–14	1.5*-1.6	5–6	1–7 (pp. 19–23)	46–48
18	Series: Derive and apply the formula for the sum of an arithmetic and a geometric sequence	15–19	1.7 (no. 1)	6	1–8 (pp. 24–30)	48–55
19	Solve problems related to arithmetic and geometric series	19–20	1.7 (no. 2–5)	6	1–9 (pp. 30–35)	56–59
Note: The proofs of the sums of an arithmetic and a geometric sequence must be known for examination purposes.						

CLEVER: KEEPING MATHS SIMPLE Week 5 *Select						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
20	Solve problems related to arithmetic and geometric series cont.	20–22	1.8 (no. 1–5)	6–7		
21	Solve problems related to arithmetic and geometric series cont.	22–23	1.8 (no. 6–12)	7–8		
22	Apply arithmetic and geometric sequences and series to solving problems	23–26	1.9*	8–9		
23	Investigate convergent and divergent series	26–34	1.10	10–16		
24	Derive and apply the formula for the sum to infinity of a geometric series	34–36	1.11 (no. 1–4)	16	1–10 (pp. 36–38)	59–62

CLEVER: KEEPING MATHS SIMPLE Week 6 *Select						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
25	Solve problems related to the sum to infinity of a geometric series	36–37	1.11 (no. 5–10)	16–17	1–11 (pp. 38–42)	62–66
26	**Functions and Inverse Functions: CAPS p. 40** Revise sketching the graphs of the straight line, parabola, hyperbola and exponential functions	40–45	2.1 (no. 1)*	32–35	2–1 (pp. 48–53)	84–89
27	Determine the equations of the straight line, parabola, hyperbola and exponential functions	45–46	2.1 (no. 2)	35		
28	Define *function*; Analyse relations and different functions; Determine the domain and range	47–49	2.2	36	2–2 (pp. 53–55)	89–92
29	Define *the inverse of a function*; Determine the inverse and sketch graphs	49–52	2.3	36–38	2–3 (pp. 56–61)	92–95
Note: Refer to Lesson 25: The revision exercises (LB pp. 38–39; TG pp. 17–20) should be done by the learners at home. Full solutions can be photocopied from the Teacher's Guide.						

CLEVER: KEEPING MATHS SIMPLE Week 7						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
30	Determine the inverse of a many-to-one function and how the domain of a function may be restricted; Sketch graphs (*leave out inverse of exponential function*)	52–54 56–57	2.4	39–40		
31	Sketch functions and inverses; Restrict domains; Sketch graphs (use *Everything Maths*)				2–4 (pp. 61–67)	96–101
32	Sketch functions and inverses; Restrict domains; Average gradient; Sketch graphs cont. (use *Everything Maths*)				2–5 (pp. 67–70)	101–106
33	Revise functions and inverse functions	58	Rev. (no. 1–5)	41		
34	Revise functions and inverse functions cont.	58–60	Rev. (no. 6–9)	41–42		

CLEVER: KEEPING MATHS SIMPLE Week 8						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
35	**Exponential and Logarithmic Functions: CAPS p. 41** Revise exponential functions; Analyse logarithmic functions	61–66	3.1–3.2	54–57		
36	Understand the definition of a logarithm; Solve simple logarithmic equations	66–68	3.3	58	2–6 (pp. 70–74)	106–107
37	Evaluate and expand expressions using the laws of logarithms *(not examinable)*; Use logarithms to solve exponential equations	68–73	3.4–3.5	59	2-7–2-9 (pp. 74–82) 2.11 (pp. 88–89)	108–114 116–117
38	Analyse and sketch the graphs of the exponential and logarithmic functions	73–77	3.6	59–61	2–10 (pp. 82–88)	114–116
39	Revise exponential and logarithmic functions	78–80	Rev.	61–62	2–12 (pp. 91–94)	118–126
Note: Refer to Lesson 37: Exercise 3.4 and Exercise 3.5 (no. 2) is optional.						

CLEVER: KEEPING MATHS SIMPLE Week 9: Catch up, consolidation and revision – plan your week						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
40	**Formal assessment: Test option 2: Algebra** (optional – depending on time constraints)					
41						
42						
43						
44						
Note: Revise examination type questions on all Terms 1 and 2 topics during this week. These may be chosen from the revision exercises, various tasks or past papers.						

CLEVER: KEEPING MATHS SIMPLE Week 10: Mid-year examinations

2.3 *Maths Handbook and Study Guide*

MATHS HANDBOOK AND STUDY GUIDE Week 1						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
1	**Euclidean Geometry: CAPS p. 48** Revise Grade 11 circle geometry theory and general geometry; Solve problems involving ratio and proportion	239–244; 264	1	99–100	8–1–8–2 (pp. 312–322)	384–395
2	Discuss the area of triangles; Prove the theorem◊ which states that a line drawn parallel to one side of a triangle divides the other two sides proportionally; Solve numerical problems involving this theorem *(First discuss Examples 1–3)*	245–248; 264	2 (no. 1)	99–100	8–3–8–4 (pp. 323–330)	395–403
3	Solve numerical problems and riders involving this theorem *(First discuss Examples 4–5)*	249–250 264–265	2 (no. 2–3)	100–101	8–5 (pp. 330–334)	404–406
4	Prove the converse of the above proportionality theorem; Discuss the midpoint theorem and converse; Solve riders involving these theorems	251–252; 266–267	3; 4	102–103		
Note: ◊ Proof of this theorem must be known for examination purposes but not the proof of the converse.						

MATHS HANDBOOK AND STUDY GUIDE Week 2						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
5	Discuss the similarity of polygons; Prove the theorem◊ (and the converse) which states that equiangular triangles are similar; Solve riders involving these theorems	255–258; 268	5 (no. 1–2)	99; 103	8–6–8–7 (pp. 334–341)	407–411
6	Solve riders involving similarity cont.	268–269	5 (no. 3–7)	104–105	8–8 (pp. 341–348)	411–414
7	Prove the Pythagorean Theorem (and the converse) by similar triangles◊; Solve numerical problems and riders involving this theorem	259–263; 269	6	105–106	8–9 (pp. 348–352)	414–417
8	Solve numerical problems and more complex riders involving the above theorems	270	Mixed ex. (no. 1–3)	106–107	8–10 (no. 1–3) (pp. 353–355)	417–419
9	Solve numerical problems and more complex riders cont.	271–272	Mixed ex. (no. 4–7)	107–108	8–10 (no. 4–7) (pp. 355–356)	419–422
Note: ◊ Proof of this theorem must be known for examination purposes but not the proof of the converse.						

MATHS HANDBOOK AND STUDY GUIDE Week 3						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
10	Solve numerical problems and more complex riders cont.	272–273	Mixed ex. (no. 8–10)	109	8–10 (no. 8–10) (pp. 356–357)	422–424
11	Revise Euclidean Geometry (use *Everything Maths*)				8–10 (no. 11–14) (pp. 357–358)	424–428
12	**Patterns, Sequences and Series: CAPS p. 40** Revise quadratic sequences; extend sequences and determine the general terms (use *Everything Maths*)	3	–	4	1–3 (pp. 9–12)	34–37
13	Arithmetic and geometric sequences: Compare these sequences and apply the general term to solving problems to solving questions	4–6 19	1 (no. 1–2)	4–6	1-1–1-2 (pp. 4–9)	26–33
14	Solve problems related to arithmetic and geometric sequences	6–7 19	1 (no. 3–7)	6–7	1-4–1-6 (pp. 13–18)	37–45
Notes: 1. Refer to Lessons 10 and 11: If learners are finding these riders too difficult, it may be necessary for riders to be solved as a whole class discussion or in small groups. 2. If the suggested work is not complete or consolidation is needed, then from Lesson 12 onwards, one rider per day may be chosen from *Everything Maths* Exercise 8–10 (LB pp. 353–358; TG pp. 417–428) for learners to do at home (with the solution done in class on the subsequent day).						

MATHS HANDBOOK AND STUDY GUIDE Week 4 #Supplement						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
15	**Formal assessment: Test option 1: Euclidean geometry**					
16	Series: Derive and apply the formula for the sum of an arithmetic and a geometric sequence	8–10 19	2 (no. 1)	4 8	1–8 (pp. 24–30)	48–55
17	Solve problems related to arithmetic and geometric series	11–12 19	2 (no. 2–6)#	8–10	1–9 (pp. 30–35)	56–59
18	Sigma notation: Expand, evaluate and write series in sigma notation (use *Everything Maths*)				1–7 (pp. 19–23)	46–48
19	Solve problems related to sigma notation	13–14 20	3	4 10–11		
Note: The proofs of the sums of an arithmetic and a geometric sequence must be known for examination purposes.						

MATHS HANDBOOK AND STUDY GUIDE Week 5 #Supplement						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
20	Derive and apply the formula for the sum to infinity of a geometric series	14–15 20	4#	5 11–12	1–10 (pp. 36–38)	59–62
21	Solve problems related to the sum to infinity of a geometric series (use *Everything Maths*)				1–11 (pp. 38–42)	62–66
22	Apply arithmetic and geometric sequences and series to solving problems	16–18 20–21	5	5 12		
23	Solve mixed questions related to sequences and series	21	Mixed ex. (no. 1–6)	13–14		
24	Solve mixed questions related to sequences and series cont.	21–22	Mixed ex. (no. 7–13)	14–16		

MATHS HANDBOOK AND STUDY GUIDE Week 6 #Supplement						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
25	Revise patterns, sequences and series (use *Everything Maths*)				1–12* (pp. 44–45)	66–81
26	**Functions and Inverse Functions: CAPS p. 40** Revise the straight line, parabola, hyperbola and exponential functions (use *Everything Maths*)	24–26	– (Notes on rev. and summary)	17	2–1 (pp. 48–53)	84–89
27	Define *function*; Analyse relations and different functions	27–28 44	1#	17–18	2–2 (pp. 53–55)	89–92
28	Define *the inverse of a function*; Determine the inverse of linear functions; Determine the domain and range of the inverse (use *Everything Maths*)				2–3 (pp. 56–61)	92–95
29	Determine the inverse and how the domain of a function may be restricted; Sketch graphs	29–36 44	2 (no. 1–2)	17–18	2–4 (no. 1–2) (pp. 61–66)	96–98
Note: Refer to Lesson 25: For consolidation, Exercises 1–12 may be completed by learners at home (with full photocopied solutions provided once learners have done the work).						

MATHS HANDBOOK AND STUDY GUIDE Week 7						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
30	Determine the inverse and how the domain of a function may be restricted; Sketch graphs cont.; Review assignment done in previous week	45	2 (no. 3–5)	19		
31	Sketch functions and inverses; Restrict domains; Sketch graphs cont. (use *Everything Maths*)				2–4 (pp. 61–67)	96–101
32	Sketch functions and inverses; Average gradient; Increasing and decreasing functions (use *Everything Maths*); Revise functions and inverse functions	48	Mixed ex. (no. 1, 3, 4)	21–22	2–5 (pp. 67–70)	101–106
33	**Exponential and Logarithmic Functions: CAPS p. 41** Understand the definition of a logarithm; Solve simple logarithmic equations	37 45	3	17–19	2–6 (pp. 70–74) 2.11 (pp. 88–89)	106–107 116–117
34	Determine and sketch the graphs of the exponential and logarithmic functions	38–42 45–46	4 (no. 1–2)	20	2–10 (pp. 82–88)	114–116

MATHS HANDBOOK AND STUDY GUIDE Week 8						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
35	Analyse and sketch the exponential and logarithmic functions	46–47	4 (no. 3–6)	20–21		
36	Evaluate and expand expressions using the laws of logarithms *(not examinable)*	43 47	5	21	2-7–2-9 (pp. 74–82)	108–114
37	Revise exponential and logarithmic functions	48–49	Mixed ex. (no. 2, 5, 6)	22		
38	Revise functions (use *Everything Maths*)				2–12 (no. 1–6) (pp. 91–92)	118–123
39	Revise functions cont. (use *Everything Maths*)				2–12 (no. 7–11) (pp. 92–94) 2–13 (pp. 94–95)	123–126 127–131
Notes: 1. Refer to lesson 36: Manipulation involving logarithmic laws is optional. 2. Refer to lesson 39: Exercises 2–13 is optional (for enrichment).						

MATHS HANDBOOK AND STUDY GUIDE Week 9*:* Catch up, consolidation and revision – plan your week						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
40	**Formal assessment: Test option 2: Algebra** (optional – depending on time constraints)					
41						
42						
43						
44						
Note: Revise examination type questions on all Terms 1 and 2 topics during this week. These may be chosen from the revision exercises, various tasks or past papers.						

MATHS HANDBOOK AND STUDY GUIDE Week 10: Mid-year examinations

2.4 *Mind Action Series Mathematics*

MIND ACTION SERIES MATHEMATICS Week 1						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
1	**Euclidean Geometry: CAPS p. 48** Revise general geometry and Grade 11 circle geometry theory	233–242	Rev. ex.	247–249	8–1 (pp. 312–319)	384–389
2	Discuss areas of triangles, ratio and proportion; Investigate and prove the theorem◊ which states that a line drawn parallel to one side of a triangle divides the other two sides proportionally	243–247	Inv. 1	–	8-2–8-4 (pp. 319–330)	389–403
3	Solve numerical problems involving this theorem *(First discuss Examples 1–2)*	248; 251	1 (no. 1–6)	249–251	8–5 (pp. 330–334)	404–406
4	Solve numerical problems and riders involving proportionality *(First discuss Examples 3–4)*	249–250; 252	1 (no. 7–12)	251–253		
Notes:	1. Read *An approach to teaching Euclidean Geometry* (TG p. 246) for useful advice. 2. ◊ Proof of this theorem must be known for examination purposes but not the proof of the converse.					

MIND ACTION SERIES MATHEMATICS Week 2 *Select						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
5	Solve numerical problems and riders involving proportionality	253	1 (no. 13–17)	254–257		
6	Discuss and prove the converse of the Proportionality Theorem; Discuss and prove the Mid-point Theorem and converse *(proofs not for examination purposes)*	254–259	2; 3*	258–263		
7	Revise similarity of polygons; Prove the theorem◊ which states that equiangular triangles are similar; Solve numerical problems and riders involving this theorem	259–263	4	264–266	8-6–8-7 (pp. 334–341)	407–411
8	Solve more complex riders involving similarity	264–268	5 (no. 1–4)	267–268		
9	Solve more complex riders cont.	268–269	5 (no. 5–9)	269–272	8–10 (no. 1–7) (pp. 353–356)	417–422
Notes:	1. ◊ Proof of this theorem must be known for examination purposes but not the proof of the converse. 2. Refer to Lesson 8: Discuss hints on how to solve more complex riders involving similarity (LB p. 264).					

MIND ACTION SERIES MATHEMATICS Week 3 *Select #Supplement						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
10	Solve more complex riders cont.; Converse of Similarity Theorem *(proof not for examination purposes)*	269–275	6*-7	273–279	8–10 (no. 8–14) (pp. 356–358) 8–8 (pp. 341–348)	422–428 411–414
11	Prove the Pythagorean Theorem by similar triangles (Theorems 4 and 5)◊; Solve numerical problems and riders involving these theorems	275–278	8	280–284	8–9 (pp. 348–352)	414–417
12	**Patterns, Sequences and Series: CAPS p. 40** Revise quadratic number patterns	1–2	Rev.	1–4	1–3 (pp. 9–12)	34–37
13	Arithmetic sequences: Derive and apply the general term to solving problems (*Examples 1–3*)	2–5	1 (no. 1–3)#	4	1–1 (p. 4)	26–28
14	Solve arithmetic sequences problems (*Example 4*)	4–5	1 (no. 4–7)#	5	1–2 (pp. 5–9)	28–33
Notes: 1. ◊ Proof of these theorems must be known for examination purposes. 2. Refer to Lessons 10 and 11: If learners are finding these riders too difficult, it may be necessary for riders to be solved as a whole class discussion or in small groups. 3. For consolidation, from Lesson 12 onwards, one rider per day may be chosen from the remainder of Exercise 6 (LB pp. 272–273; TG pp. 273–278), the Revision exercise (LB pp. 279–282; TG pp. 285–296) and Some Challenges (LB pp. 283–287; TG pp. 296–306) for learners to do at home (with the solution done in class on the subsequent day).					

MIND ACTION SERIES MATHEMATICS Week 4 #Supplement						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
15	**Formal assessment: Test option 1: Euclidean geometry**					
16	Geometric sequences: Derive and apply the general term to solving problems (*Examples 5–6*); Revise basic exponential and other equations	5–9	2 (no. 1–2)	5–6	1–4 (pp. 13–14)	37–38
17	Solve geometric sequences problems (*Examples 7–8*)	8–10	2 (no. 3–7)#	6–8	1-5–1-6 (pp. 15–18)	39–45
18	Series and sigma notation: Expand, evaluate and write series in sigma notation	10–14	3	8	1–7 (pp. 19–23)	46–48
19	Series: Derive and apply the formula for the sum of an arithmetic sequence (*Examples 17–20*)	14–16 18	4 (no. 1–6)	8–10	1–8 (pp. 24–30)	48–55
Note: The proofs of the sums of an arithmetic and a geometric sequence must be known for exam purposes.						

MIND ACTION SERIES MATHEMATICS Week 5 *Select						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
20	Solve problems related to arithmetic series (*Examples 21–22*)	17–19	4 (no. 7–14)	10–13		
21	Series: Derive and apply the formula for the sum of a geometric sequence (*Examples 23–26*)	19–24	5 (no. 1–5)	13–14	1–9 (pp. 30–35)	56–59
22	Solve problems related to geometric series (*Examples 27–28*)	22–24	5 (no. 6–9)	14–17		
23	Solve arithmetic and geometric sequences problems involving simultaneous equations	24–25 27–28	6*	17–22		
24	Investigate convergent and divergent series; Derive and apply the formula for the sum to infinity of a geometric series (*Examples 33–35*)	28–31 33	7 (no. 1–3)	22–23	1–10 (pp. 36–38)	59–62

MIND ACTION SERIES MATHEMATICS Week 6 #Supplement						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
25	Solve problems related to the sum to infinity of a geometric series (*Examples 36–38*)	32–34	7 (no. 4–9)	23–25	1–11 (pp. 38–42)	62–66
26	**Functions and Inverse Functions: CAPS p. 40** Revise the parabola, the straight line and the exponential function (use *Everything Maths*)				2–1 (pp. 48–53)	84–89
27	Define *function*; Analyse relations and different functions	38–41	1#	36	2–2 (pp. 53–55)	89–92
28	Define *the inverse of a function*; Determine and sketch the inverse of a linear function	42–44	2	37–39		
29	Determine and sketch the inverse of a linear function (use *Everything Maths*)				2–3 (pp. 56–61)	92–95
Note: Refer to Lesson 25: Learners should do the revision for patterns, sequences and series at home (LB pp. 35–37). Full solutions in the Teacher's Guide can be photocopied for them (TG pp. 25–30).						

MIND ACTION SERIES MATHEMATICS Week 7						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
30	Determine and sketch the inverse of a quadratic function; Restrict the domain of the function; Determine the domain and the range	44–46	3 (no. 1a-c)	39–41		
31	Determine and sketch the inverse of a quadratic function cont.; Restrict the domain of the function cont.; Determine the domain and the range cont.	44–46	3 (no. 1d-f, 2)	41–44	2–4 (pp. 61–67)	96–101
32	Sketch functions and inverses; Determine the average gradient and intervals on which functions increase/decrease (use *Everything Maths*)				2–5 (pp. 67–70)	101–106
33	**Exponential and Logarithmic Functions: CAPS p. 41** Understand the definition of a logarithm; Solve simple logarithmic equations (use *Everything Maths*)				2–6 (pp. 70–74)	106–107
34	Determine and sketch the graph of the exponential and logarithmic functions	46–51	4 (no. 1)	44	2–10 (pp. 82–88)	114–116

MIND ACTION SERIES MATHEMATICS Week 8						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
35	Determine and sketch the graph of the exponential and logarithmic functions cont.	51	4 (no. 2–5)	45–47		
36	Evaluate and expand expressions using the laws of logarithms *(not examinable)*; Solve simple logarithmic equations	52–57 57–58	5–7 8	47–50 50–51	2-7–2-8 (pp. 74–79) 2–9 (pp. 79–82)	108–111 112–114
37	Applications of logarithms	59–60	9	52–53	2–11 (pp. 88–89)	116–117
38	Revise exponential and logarithmic functions	60–61	Rev.	53–56		
39	**Formal assessment: Test option 2: Algebra** (optional – depending on time constraints)					
Note: Manipulation of logarithmic laws (part of Lesson 36) is optional.						

MIND ACTION SERIES MATHEMATICS Week 9*:* Catch up, consolidation and revision – plan your week						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
40						
41						
42						
43						
44						
Note: Revise exam type questions on all Terms 1 and 2 topics during this week. These may be chosen from the revision exercises, various tasks or past papers.						

MIND ACTION SERIES MATHEMATICS Week 10: Mid-year examinations

2.5 *Platinum Mathematics*

PLATINUM MATHEMATICS Week 1 #Supplement						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
1	**Euclidean Geometry: CAPS p. 48** Revise Grade 11 circle geometry	214–217	1	194–197	8–1 (pp. 312–319)	384–389
2	Revise the necessary and sufficient conditions for polygons to be similar; Discuss the area of triangles	218–221	2	197–198	8–2 (pp. 319–322)	389–395
3	Prove the theorem◊ which states that a line drawn parallel to one side of a triangle divides the other two sides proportionally; Discuss the Midpoint Theorem and the converse; Solve numerical problems involving these theorems	222–226	3#	198–200	8–3–8–4 (pp. 323–330)	395–403
4	Solve more complex riders involving proportionality (use *Everything Maths*)	–	–	–	8–5 (pp. 330–334)	404–406
Note:	1. Read *Teaching Guidelines* (TG) for each unit, preceding each exercise. 2. ◊ Proof of this theorem must be known for examination purposes but not the proof of the converse.					

PLATINUM MATHEMATICS Week 2 #Supplement						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
5	Prove the theorem◊ which states that equiangular triangles are similar; Solve numerical problems and riders involving similarity	227–229	4 (no. 1–2)	200–201	8–6 (pp. 334–337)	407–408
6	Solve numerical problems and riders involving similarity	229–230	4 (no. 3–5)#	201–202	8–7 (pp. 337–341)	408–411
7	Discuss and prove the converse of the above theorem, i.e. prove that triangles with proportional sides are similar; Solve numerical problems and riders involving this theorem	231–233	5 (no. 1–3)	202–205	8–8 (pp. 341–348)	411–414
8	Solve more riders involving this theorem	233–234	5 (no. 4–9)	205–208		
9	Prove the Pythagorean Theorem by similar triangles◊; Solve numerical problems and riders involving this theorem	235–236	6#	208–210	8–9 (pp. 348–352)	414–417
Notes:	1. Read *Teaching Guidelines* (TG) for each unit, preceding each exercise. 2. ◊ Proof of this theorem must be known for examination purposes but not the proof of the converse.					

PLATINUM MATHEMATICS Week 3						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
10	Solve numerical problems and more complex riders involving the above theorems	237–238	Rev. test (no. 1–4)	210–212	8–10 (no. 1–7) (pp. 353–356)	417–422
11	Solve more complex riders cont.	238–239	Rev. test (no. 5–7)	212–214	8–10 (no. 8–14) (pp. 356–358)	422–428
12	**Patterns, Sequences and Series: CAPS p. 40** Revise number patterns (use *Siyavula*)				1–3 (pp. 9–12)	34–37
13	Arithmetic sequences: Derive and apply the general term to solving problems	4–6	1	2–4	1–1 (p. 4)	26–28
14	Solve arithmetic sequences problems	6–7	2	4	1–2 (pp. 5–9)	28–33
Notes: 1. Refer to Lessons 10 and 11: Read *Teaching Guidelines* (TG) for each unit, preceding each exercise. 2. Refer to Lessons 10 and 11: If learners are finding these riders too difficult, it may be necessary for riders to be solved as a whole class discussion or in small groups. 3. If the Revision exercise is not finished, then from Lesson 12 onwards, one rider per day may be chosen from this exercise for learners to do at home (with the solution done in class on the subsequent day).						

PLATINUM MATHEMATICS Week 4						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
15	**Formal assessment: Test option 1: Euclidean geometry**					
16	Geometric sequences: Derive and apply the general term to solving problems	8–9	3	5–6	1–4 (pp. 13–14)	37–38
17	Solve geometric sequences problems	10–11	4	6–7	1-5–1-6 (pp. 15–18)	39–45
18	Series: Derive and apply the formula for the sum of an arithmetic sequence	12–14	5	7–9	1–8 (pp. 24–30)	48–55
19	Series: Derive and apply the formula for the sum of a geometric sequence	15–16	6	9–10	1–9 (pp. 30–35)	56–59
Note: The proofs of the sums of an arithmetic and a geometric sequence must be known for examination purposes.						

PLATINUM MATHEMATICS Week 5 *Select						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
20	Investigate convergent and divergent series; Derive and apply the formula for the sum to infinity of a geometric series	16–17	7#	10	1–10 (pp. 36–38)	59–62
21	Sigma notation: Expand, evaluate and write series in sigma notation	18–20	8	10–11	1–7 (pp. 19–23)	46–48
22	Practical applications: Solve mixed types of questions involving arithmetic and geometric series	21–24	9	11–14	1–11 (pp. 38–42)	62–66
23	Solve problems involving quadratic patterns and combinations of arithmetic and geometric sequences	25–28	10*	14–17		
24	Revise patterns, sequences and series	29	Rev. (no. 1–6)	17–18	1–12 (no. 1–9) (p. 44)	66–71

PLATINUM MATHEMATICS Week 6 #Supplement						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
25	Revise patterns, sequences and series	29–30	Rev. (no. 7–17)	18–20	1–12 (no. 10–29) (pp. 44–46)	71–81
26	**Functions and Inverse Functions:** **CAPS p. 40** Revise the parabola, the straight line and the exponential function (use *Siyavula*)				2–1 (pp. 48–53)	84–89
27	Define *function*; Analyse relations and different functions; Determine the domain and range	34–36	1 (no. 1–3)	25	2–2 (pp. 53–55)	89–92
28	Analyse relations and different functions; Determine the domain and range	36	1 (no. 4–6)	25–26		
29	Define *the inverse of a function*; Determine the inverse of linear functions; Sketch graphs	37 39	2 (no. 1.1–1.2)#	26	2–3 (pp. 56–61)	92–95
Note: Refer to Lesson 25: Learners should complete the revision exercise for patterns, sequences and series at home (LB pp. 17–20). Full solutions in the Teacher's Guide can be photocopied for them (TG pp. 66–81).						

PLATINUM MATHEMATICS Week 7						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
30	Determine the inverse functions; Sketch graphs; Determine the domain and range	38–40	2 (no. 1.3– 6)	27–28		
31	Determine the inverse of quadratic functions; Restrict domains; Sketch graphs (use *Everything Maths*)				2–4 (pp. 61–67)	96–101
32	Determine the inverse of more complex functions; Review assignment done in previous week	41–42	3	28–29		
33	Sketch functions and inverses; Determine average gradient and intervals on which functions increase/decrease (use *Everything Maths*)				2–5 (pp. 67–70)	101–106
34	Revise functions and inverse functions	43–47	Rev.	30–32		

PLATINUM MATHEMATICS Week 8 *Select						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
35	**Exponential and Logarithmic Functions: CAPS p. 41** Revise exponents, exponential functions and their graphs	48–50	1	33–34		
36	Understand the definition of a logarithm; Solve simple logarithmic equations	51–52	2	35–36	2–6 (pp. 70–74) 2–9 (pp. 79–82)	106–107 112–114
37	Determine and sketch the graph of the exponential and logarithmic functions	52–54	3	36–37	2–10 (pp. 82–88)	114–116
38	Determine and sketch the graph of the exponential and logarithmic functions	54–56	4–5*	38–40		
39	Evaluate and expand expressions using the laws of logarithms (use *Everything Maths*) (*not examinable*); Solve log inequalities using logarithmic graphs	57	6	40–41	2-7–2-8 (pp. 74–79) 2.11 (pp. 88–89)	108–111 116–117
Note: Manipulation of logarithmic laws (part of Lesson 39) is optional.						

PLATINUM MATHEMATICS Week 9: Catch up, consolidation and revision – plan your week						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
40	**Formal assessment: Test option 2: Algebra** (optional – depending on time constraints)					
41						
42						
43						
44						
Note: Revise exam type questions on all Terms 1 and 2 topics during this week. These may be chosen from the revision exercises, various tasks or past papers.						

PLATINUM MATHEMATICS Week 10: Mid-year examinations

2.6 *Siyavula Everything Maths*

SIYAVULA EVERYTHING MATHS Week 1				
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**
1	**Euclidean Geometry: CAPS p. 48** Revise general geometry and Grade 11 circle geometry	312–317	8–1 (no. 1–4)	384–386
2	Revision circle geometry cont.	317–319	8–1 (no. 5–10)	386–389
3	Discuss and solve problems involving ratio and proportion	319–322	8–2	389–395
4	Discuss proportionality in polygons and in triangles	323–330	8–3–8–4	395–403

SIYAVULA EVERYTHING MATHS Week 2				
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**
5	Prove the theorem◊ (and converse) which states that a line drawn parallel to one side of a triangle divides the other two sides proportionally; Solve numerical problems and riders involving this theorem	330–334	8–5	404–406
6	Discuss the similarity of polygons; Prove the theorem◊ which states that equiangular triangles are similar; Solve numerical problems and riders involving similarity	334–341	8–6–8–7	408–411
7	Discuss and prove the converses of the above theorem *(not for examination purposes)*	341–348	8–8	411–414
8	Prove the Pythagorean Theorem by similar triangles◊; Solve numerical problems and riders involving this theorem	348–352	8–9	414–417
9	Solve numerical problems and more complex riders involving the above theorems	353–356	8–10 (no. 1–5)	417–420
Note: ◊ Proof of this theorem must be known for examination purposes but not the proof of the converse.				

SIYAVULA EVERYTHING MATHS Week 3				
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**
10	Solve more complex numerical problems and riders cont.	356–357	8–10 (no. 6–10)	420–424
11	Solve more complex numerical problems and riders cont.	357–358	8–10 (no. 11–14)	424–428
12	**Patterns, Sequences and Series: CAPS p. 40** Revise quadratic number patterns	9–12	1–3	34–37
13	Arithmetic sequences: Extend the pattern and generate terms	4	1–1	26–28
14	Arithmetic sequences: Derive and apply the general term to solving problems	5–8	1–2 (no. 1–6)	28–31
Notes: 1. Refer to Lessons 10 and 11: If learners are finding these riders too difficult, it may be necessary for riders to be solved as a whole class discussion or in small groups. 2. For consolidation, from Lesson 12 onwards, one rider per day may be chosen from *Practise Maths* (online) or other sources for learners to do at home (with the solution done in class on the subsequent day).				

SIYAVULA EVERYTHING MATHS Week 4				
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**
15	**Formal assessment: Test option 1: Euclidean geometry**			
16	Solve arithmetic sequences problems	8–9	1–2 (no. 7–12)	31–33
17	Geometric sequences: Extend the pattern and generate terms; Derive the formula and determine general terms	13–15	1–4–1–5	37–40
18	Solve geometric sequences problems	16–18	1–6	40–45
19	Sigma notation: Expand, evaluate and write series in sigma notation; Solve problems	19–23	1–7	46–48

SIYAVULA EVERYTHING MATHS Week 5				
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**
20	Series: Derive and apply the formula for the sum of an arithmetic sequence	24–30	1–8	48–55
21	Series: Derive and apply the formula for the sum of a geometric sequence	30–35	1–9	56–59
22	Investigate convergent and divergent series	36–38	1–10	59–62
23	Derive and apply the formula for the sum to infinity of a geometric series	38–42	1–11	62–66
24	Revise patterns, sequences and series	43–45	1–12 (no. 1–14)	66–73
Note: The proofs of the sums of an arithmetic and a geometric series must be known for examination purposes.				

SIYAVULA EVERYTHING MATHS Week 6				
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**
25	Revise patterns, sequences and series cont.	45–46	1–12 (no. 15–29)	73–81
26	**Functions and Inverse Functions: CAPS p. 40** Revise the linear, the quadratic (parabola) and the exponential function	48–53	2–1	84–89
27	Define *function*; Analyse relations and different functions; Determine the domain and range	53–55	2–2	89–92
28	Define *the inverse of a function*; Determine the inverse, domain and range of the linear function; Sketch graphs	56–61	2–3	92–95
29	Determine the inverse of the quadratic function (parabola) and how the domain of a function may be restricted; Sketch graphs	61–66	2–4 (no. 1–2)	96–98

SIYAVULA EVERYTHING MATHS Week 7				
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**
30	Sketch quadratic functions and inverses; Restrict domains	66–67	2–4 (no. 3–6)	98–101
31	Sketch functions and inverses; Restrict domains; Determine average gradients; Review investigation done in previous week	67–70	2–5	101–106
32	Revise functions and inverse functions	91–92	2–12 (no. 1–3)	118–120
33	Revise functions and inverse functions cont. (*for enrichment*)	94–95	2–13	127–131
34	**Exponential and Logarithmic Functions: CAPS p. 41** Revise graphs of exponential functions; Determine the inverse of the exponential function: Introduce logarithms	70–74	2–6	106–107

SIYAVULA EVERYTHING MATHS Week 8				
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**
35	Evaluate and expand expressions using the laws of logarithms *(not examinable)*; Use a calculator to determine the value of expressions and variables	74–79 79–82	2-7–2-8 2–9	108–111 112–114
36	Determine and sketch the graphs of exponential and logarithmic functions	82–88	2–10	114–116
37	Solve problems involving logarithms	88–89	2–11	116–117
38	Revise exponential and logarithmic functions	90–92	2–12 (no. 4–7)	120–123
39	Revise exponential and logarithmic functions cont.	93–94	2–12 (no. 8–11)	124–126
Note: The application of the laws of logarithms – Exercises 2-7–2-8 (Lesson 35) is optional.				

SIYAVULA EVERYTHING MATHS Week 9: Catch up, consolidation and revision – plan your week				
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**
40	**Formal assessment: Test option 2: Algebra** (optional – depending on time constraints)			
41				
42				
43				
44				
Note: Revise exam type questions on all Terms 1 and 2 topics during this week. These may be chosen from the revision exercises, various tasks or past papers.				

SIYAVULA EVERYTHING MATHS Week 10: Mid-year examinations

2.7 *Via Afrika Mathematics*

VIA AFRIKA MATHEMATICS Week 1 #Supplement						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
1	**Euclidean Geometry: CAPS p. 48** Revise general geometry and Grade 11 circle geometry	236–240	Questions (no. 1–6)	305–307	8-1–8-2 (pp. 312–322)	384–395
2	Revise circle geometry cont.; Discuss the similarity of polygons and basic ratios	241; 242–243	Questions (no. 7–10); Questions	307–308; 309	8–6 (pp. 334–337)	407–408
3	Discuss proportionality in triangles; Prove the theorem◊ (and converse) which states that a line drawn parallel to one side of a triangle divides the other two sides proportionally; Solve numerical problems involving this theorem	244–246 246–249	1 2 (no. 1–3)	312 313	8-3–8-4 (pp. 323–330)	395–403
4	Solve more complex riders involving proportionality	249	2 (no. 4–6)#	313	8–5 (pp. 330–334)	404–406
Notes:	1. ◊ Proof of this theorem must be known for examination purposes but not the proof of the converse. 2. Refer to Lesson 3: Read the *Guidance and advice* (TG pp. 310–311).					

VIA AFRIKA MATHEMATICS Week 2 #Supplement						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
5	Prove the theorem◊ which states that equiangular triangles are similar; Solve numerical problems and riders involving similarity	250–252	3	314–316	8–7 (pp. 337–341)	408–411
6	Discuss and prove the converses of the above theorem *(not for examination purposes)*	252–254	4 (no. 1–4)	316–318		
7	Solve more complex numerical problems and riders involving similarity	255	4 (no. 5–7)#	318	8–8 (pp. 341–348)	411–414
8	Prove the Pythagorean Theorem by similar triangles◊; Solve numerical problems and riders involving this theorem	256–257	5	320–321	8–9 (pp. 348–352)	414–417
9	Solve numerical problems and more complex riders involving the above theorems	258–259	Questions (no. 1–5)	321		
Notes:	1. ◊ Proof of this theorem must be known for examination purposes but not the proof of the converse. 2. Refer to Lesson 5: Read the *Guidance and advice* (TG pp. 314–315). 3. Refer to Lesson 8: Read the *Guidance and advice* (TG pp. 319–320).					

VIA AFRIKA MATHEMATICS Week 3 *Select						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
10	Solve more complex numerical problems and riders cont.	260	Questions (no. 6–10)	321–322	8–10 (no. 1–7) (pp. 353–356)	417–422
11	Solve more complex numerical problems and riders cont.	261	Questions (no. 11–15)	323–324	8–10 (no. 8–14) (pp. 356–358)	422–428
12	**Patterns, Sequences and Series: CAPS p. 40** Revise number patterns	8–9	Questions	29–30	1–3 (pp. 9–12)	34–37
13	Arithmetic sequences: Derive and apply the general term to solving problems	10–12	1 (no. 1–2)*	31–33	1–1 (p. 4)	26–28
14	Solve arithmetic sequences problems	13	1 (no. 3–9)*	33–34	1–2 (pp. 5–9)	28–33
Notes: 1. Refer to Lessons 10 and 11: If learners are finding these riders too difficult, it may be necessary for riders to be solved as a whole class discussion or in small groups. 2. For consolidation, from Lesson 12 onwards, one rider per day may be chosen from *Everything Maths* Exercises 8–10 for learners to do at home (with the solution done in class on the subsequent day).						

VIA AFRIKA MATHEMATICS Week 4 *Select						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
15	**Formal assessment: Test option 1: Euclidean geometry**					
16	Geometric sequences: Derive and apply the general term to solving problems	14–16	2 (no. 1–3)*	35–37	1–4 (pp. 13–14)	37–38
17	Solve geometric sequences problems	16–17	2 (no. 4–11)*	37–38	1-5–1-6 (pp. 15–18)	39–45
18	Sigma notation: Expand, evaluate and write series in sigma notation (use *Everything Maths*)				1–7 (pp. 19–23)	46–48
19	Series: Derive and apply the formula for the sum of an arithmetic sequence	18–22	3 (no. 1–2)*	39–41	1–8 (pp. 24–30)	48–55
Note: Refer to Lesson 19: The proof of the sum of an arithmetic series must be known for examination purposes.						

VIA AFRIKA MATHEMATICS Week 5 *Select						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
20	Solve problems related to arithmetic series	22	3 (no. 3–8)	41–42		
21	Series: Derive and apply the formula for the sum of a geometric sequence	23–26	4 (no. 1–5)*	43–44	1–9 (pp. 30–35)	56–59
22	Solve problems related to arithmetic and geometric series	26–27	4 (no. 6–20)*	44–46		
23	Investigate convergent and divergent series; Derive and apply the formula for the sum to infinity of a geometric series	28–30	5 (no. 1–3)*	47–51	1–10 (pp. 36–38)	59–62
24	Solve problems related to the sum to infinity of a geometric series	30	5 (no. 4–7)	51	1–11 (pp. 38–42)	62–66
Note: Refer to Lesson 21: The proof of the sum of a geometric series must be known for examination purposes.						

VIA AFRIKA MATHEMATICS Week 6 *Select						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
25	Solve mixed types of questions involving arithmetic and geometric sequences and series	31	6	51–52	1–12 (pp. 44–46)	66–80
26	**Functions and Inverse Functions: CAPS p. 40** Revise the straight line, the parabola, the hyperbola and the exponential function	36–39	Questions*	57–63	2–1 (pp. 48–53)	84–89
27	Analyse relations and different functions	40–42	1	64–67		
28	Define *function*; Analyse relations and different functions cont.; Determine the domain and range	42–43	2	68	2–2 (pp. 53–55)	89–92
29	Define *the inverse of a function*; Determine the inverses by studying sets of ordered pairs	44–45	3–4	69–70		
Note: Refer to Lesson 25: The revision exercise (*Questions* (LB p. 34)) on patterns, sequences and series should be done by learners at home. The full solutions can be photocopied from the Teacher's Guide (pp. 54–56).						

VIA AFRIKA MATHEMATICS Week 7 *Select						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
30	Determine the inverse of a linear function; Sketch the graphs	46–47	5	71–73	2–3 (pp. 56–61)	92–95
31	Determine the inverse of the quadratic function; Restrict domains; Sketch graphs	48–50	6 (no. 1–3)	74–77	2–4 (no. 1–2) (pp. 61–66)	96–98
32	Determine the inverse of the quadratic function; Restrict domains; Sketch graphs	51	6 (no. 4–7)	77–79	2–4 (no. 3–5) (pp. 66–67)	98–101
33	Sketch functions and inverses; Determine the domain and range; Determine transformations	52–53	6 (no. 8–10)	79	2–5 (pp. 67–70)	101–106
34	Sketch the inverse of the exponential function (*without finding the equation*); Revise functions and inverses	53–57	7 Questions*	79–84		

VIA AFRIKA MATHEMATICS Week 8 *Select #Supplement						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
35	**Exponential and Logarithmic Functions: CAPS p. 41** Revise exponents; Revise exponential functions and their graphs	58–59	Questions#	85–86		
36	Understand the definition of a logarithm; Evaluate and expand expressions using the laws of logarithms *(not examinable)*	60–61 61–63	1 2*	87–89	2–6 (pp. 70–74) 2–7–2–8 (pp. 74–79)	106–107 108–111
37	Use logarithms to solve exponential equations; Apply logarithms to solving problems (use *Everything Maths*)	64–65	3	90–93	2–9 (pp. 79–82) 2–11 (pp. 88–89)	112–114 116–117
38	Determine and sketch the inverse of the logarithmic function	66–67 69–71	4	94–95 97–98	2–10 (pp. 82–88)	114–116
39	Revise exponential, logarithmic and other functions	71–73	5	98–99	2–12 (pp. 91–94)	118–126
Note: Manipulation of logarithmic laws (part of Lesson 36) is optional.						

VIA AFRIKA MATHEMATICS Week 9: Catch up, consolidation and revision – plan your week						
Lesson	**CAPS concepts and skills**	**LB pp.**	**LB ex.**	**TG pp.**	***Siyavula Everything Maths***	
					LB ex.	**TG pp.**
40	**Formal assessment: Test option 2: Algebra** (optional – depending on time constraints)					
41						
42						
43						
44						
Note: Revise exam type questions on all Terms 1 and 2 topics during this week. These may be chosen from the revision exercises, various tasks or past papers.						

VIA AFRIKA MATHEMATICS Week 10: Mid-year examinations

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.
   - 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. 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.
- **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. Assessment term plans

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

LTSMs	Assignment	Investigation/project	End-of-term test – 2 hours **Note:** *More than one lesson is required for the 2–hour exemplar test as lessons are only 55 minutes each*
Classroom Mathematics	**Week 8 – Lesson 35** Assignment: Use *Trig. identities and equations test* TG p. 205; Memo. pp. 206–208	**Weeks 4 and 5 – Lessons 18 and 19** No investigation/project provided for the topics in this term – must be sourced	**Week 10 – Lesson 47** Exemplar end-of-term test **Other tests:** Polynomials, the Remainder and Factor Theorems test: TG p. 244; Memo. p. 245 Differential Calculus test: TG p. 273; Memo. p. 274 Graphs of cubic functions etc. test: TG pp. 317–318; Memo. pp. 319–320 Analytical Geometry test: TG p. 373; Memo. pp. 374–375
Clever: Keeping Maths Simple	**Week 8 – Lesson 35** Assignment: Trigonometry – use *practice test* TG p. 114; Memo. p. 115	**Weeks 4 and 5 – Lessons 18 and 19** No investigation/project provided for the topics in this term – must be sourced	**Week 10 – Lesson 47** Exemplar test **Other tests:** Practice test: Polynomial functions TG p. 161; Memo. p. 162 Practice test: Differential Calculus TG p. 208; Memo. p. 209 Practice test: Trigonometric equations TG p. 125; Memo. pp. 126–127 Practice test: 2-D and 3-D Trigonometry TG pp. 147–148; Memo. pp. 149–150 Practice test: Analytical Geometry TG pp. 245–246; Memo. pp. 247–248
Maths Handbook and Study Guide	**Week 7 – Lesson 33** Assignment: Use *mixed exercise* LB pp. 113–114; TG pp. 350–351	**Week 8 – Lessons 35 and 36** Investigation: Application of Sine, Cosine and Area Rules LB p. 380; TG pp. 132–133	**Week 10 – Lesson 47** Exemplar test
Mind Action Series Mathematics	**Week 8 – Lesson 35** Assignment: Trigonometry (use selected questions from *Revision exercise*) LB pp. 144–145; TG pp. 137–142	**Weeks 4 and 5 – Lessons 18 and 19** Investigation 1–2: Calculus: Optimisation TG pp. 219–223; Memo. pp. 224–228	**Week 10 – Lesson 47** Exemplar test

LTSMs	Assignment	Investigation/project	End-of-term test – 2 hours **Note:** *More than one lesson is required for the 2–hour exemplar test as lessons are only 55 minutes each*
Platinum Mathematics	**Week 8 – Lesson 36** Assignment: Trigonometry (use selected questions from *Revision test*) LB pp. 109–110; TG pp. 72–79	**Weeks 5 and 6 – Lessons 23 and 24** Investigation: Find the maximum area of polygons with a fixed perimeter LB pp. 111–113; TG pp. 80–86	**Week 10 – Lesson 47** Exemplar test **Other tests: *The revision tests should not be used for formal assessment (because they are situated in the Learner's Book)*** Revision test: Polynomials LB pp. 140–141; TG Memo. pp. 109–113 Revision test: Differential Calculus LB pp. 184–187; TG Memo. pp. 165–171 Revision test: Compound and double angles LB pp. 109–110; TG Memo. pp. 72–79 Revision test: 2-D and 3-D Trigonometry LB pp. 130–131; TG Memo. pp. 99–102 Revision test: Analytical Geometry LB pp. 198–201; TG Memo. pp. 178–181 **Term Test:** TG pp. 346–347; Memo. pp. 267–268 **Control Test:** Test 2 pp. 4–5 (excl. geometry); Memo. pp. 18–22
Siyavula Everything Maths	**Week 8 – Lesson 34** Assignment: Trigonometry (use *end of chapter exercises 4–7 no. 7–10*) LB p. 173; TG pp. 213–218	**Weeks 4 and 5 – Lessons 18 and 19** No investigation/project provided for the topics in this term – must be sourced	**Week 10 – Lesson 47**
Via Afrika Mathematics	**Week 8 – Lesson 35** Assignment: Compound angles LB p. 131; TG pp. 150–152	**Weeks 4 and 5 – Lessons 18 and 19** No investigation/project provided for the topics in this term – must be sourced	**Week 10 – Lesson 47** Exemplar test **Test 1:** Trig, Polynomials and Calculus TG p. 289; Memo. pp. 290–291
			Contents of exemplar test: Remainder and Factor Theorems Differential Calculus Trigonometry – compound angles 2-D and 3-D Trigonometry Analytical Geometry

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

LTSMs	Test option 1: OR Euclidean geometry	Test option 2: Algebra	Mid-year exemplar Examinations in LTSMs * In the LB, so only suitable for revision/practice, not for formal assessment
Classroom Mathematics	**Week 4 – Lesson 15** Exemplar Test 1	**Week 9 – Lesson 40** Exemplar Test 2	*** Paper 1:** LB pp. 269–272 Memorandum TG pp. 376–382 *** Paper 2:** LB pp. 273–278 Memorandum TG pp. 383–390
	Other test: Euclidean Geometry Test: TG p. 433 Memorandum TG pp. 434–437	**Other tests:** Test 1: Number Patterns, Sequences and Series TG p. 78, Memorandum TG pp. 79–80 Test 2: Functions and Inverses TG p. 95, Memorandum TG pp. 96–97 Test 3: Exponential and Logarithmic Functions TG p. 123, Memorandum p. 124 **Other assessments:** Assignment: Sequences and Functions LB pp. 150–151 (omit Section B no. 2–4 and Section C p. 152) TG pp. 209–212 The Koch Snowflake Investigation: TG pp. 81–82; Rubric TG p. 83; Memorandum TG pp. 84–85; Investigation: The Cantor Set TG pp. 216–217; Rubric TG p. 218; Memorandum TG pp. 219–220	
Clever: Keeping Maths Simple	**Week 4 – Lesson 15** Exemplar Test 1	**Week 9 – Lesson 40** Exemplar Test 2	*** Paper 1:** LB pp. 414–417 Memorandum TG pp. 433–436 *** Paper 2:** LB pp. 418–422 Memorandum TG pp. 437–441
	Other test: Practice test – Euclidean Geometry: TG pp. 275–276 Memorandum TG pp. 277–278	**Other assessments:** Assignment: Exponential and Logarithmic Functions – use practice test (omit no. 7) TG pp. 72–73, Memorandum pp. 74–75 **Other tests:** Practice test: Patterns, Sequences and Series TG p. 29, Memorandum pp. 30–31 Practice test: Functions and Inverse Functions TG p. 51, Memorandum pp. 52–53	
Maths Handbook and Study Guide	**Week 4 – Lesson 15** Exemplar Test 1	**Week 9 – Lesson 40** Exemplar Test 2	*** Paper 1:** LB pp. 225–230 Memorandum TG pp. 89–94 *** Paper 2:** LB pp. 231–237 Memorandum TG pp. 94–98
	Other assessments: Euclidean Geometry (Concurrency) Project: LB pp. 385–386 Memorandum TG pp. 139–141 Rubric TG pp. 141–142	**Other assessments:** Assignment: Revision of Grade 11 functions LB pp. 383–384 Memorandum TG pp. 137–138	
Mind Action Series Mathematics	**Week 4 – Lesson 15** Exemplar Test 1	**Week 8 – Lesson 39** Exemplar Test 2	No exemplar examinations provided

LTSMs	Test option 1: OR Euclidean geometry	Test option 2: Algebra	Mid-year exemplar Examinations in LTSMs * In the LB, so only suitable for revision/practice, not for formal assessment
Platinum Mathematics	**Week 4 – Lesson 15** Exemplar Test 1	**Week 9 – Lesson 40** Exemplar Test 2	*** Paper 1:** LB pp. 202–204 Memorandum TG pp. 182–186 *** Paper 2:** LB pp. 205–208 Memorandum TG pp. 187–192
	Euclidean Geometry Test: (Term 3 Test) Questions 1–3 TG pp. 348–349 Memorandum TG pp. 269–271	**Other tests:** **Term 1 test: Questions 1–2** TG p. 339 Memorandum TG p. 262 **Control test book:** Test 1 (omit no. 6, 10–11) pp. 1–2, Memorandum pp. 13–16 **Other assessments:** Assignment: Patterns, Sequences and Series (select questions) LB pp. 31–33 Memorandum TG pp. 20–24 Assignment: Questions 1–2 TG pp. 341 Memorandum pp. 263–264 ***The revision tests should not be used for formal assessment (because they are situated in the Learner's Book):*** Revision test: Patterns, Sequences and Series LB pp. 29–30 Memorandum TG p. 17 Revision test: Functions and Inverse Functions LB pp. 43–47 Memorandum TG p. 30 Revision test: Exponential and Logarithmic Functions LB pp. 58–59 Memorandum TG p. 41	
Siyavula Everything Maths	**Week 4 – Lesson 15** Exemplar Test 1	**Week 9 – Lesson 40** Exemplar Test 2	No exemplar examinations provided
Via Afrika Mathematics	**Week 4 – Lesson 15** Exemplar Test 1	**Week 9 – Lesson 40** Exemplar test	*** Paper 1:** LB pp. 224–227 Memorandum TG pp. 292–298 *** Paper 2:** LB pp. 228–231 Memorandum TG pp. 299–304
		Other tests: **Term 1 Test 1: Number Patterns and Functions** TG pp. 169–170 Memorandum TG pp. 171–172 **Other assessments:** Project: Geometric Sequences LB pp. 32–33 Memorandum TG p. 53 Investigation: Logarithmic Functions LB pp. 68–69 Memorandum TG pp. 95–96	
	Topics in Exemplar Test 1: All geometry done in previous grades Circle Geometry Proportionality Similar Triangles	**Topics in Exemplar Test 2:** Patterns, Sequences and Series Functions and Inverse Functions Exponential and Logarithmic Functions	**Notes: If following the topics in these planners:** *** Paper 1:** Omit Finance, Growth and Decay. *** Paper 2:** Include Proportionality and Similar Triangles

5. The exemplar Term 1 test

Time: 2 hours
Total: 100 marks

INSTRUCTIONS TO LEARNERS:
1. There are eight questions. Answer all questions.
2. Show all your calculations where necessary.
3. Scientific non-programmable calculators may be used. If necessary, round off answers to TWO decimal places, unless stated otherwise.
4. Diagrams are not drawn to scale.
5. A formula sheet is provided.
6. Write neatly and legibly.

QUESTION 1

1.1 Determine the value of d *if* $x^3 + dx^2 - x + 5$ *is divided by* $x - 2$ *and* gives a remainder of 23. (4)

1.2 Determine $\lim_{x \to 3} \frac{3x^2 - 27}{x - 3}$ (3)

1.3 If $f(x) = 2x^2 + 3$ determine $f'(x)$ from first principles. (5)

1.4 If $P - 2v = v^3$ determine $\frac{dP}{dv}$ (2)

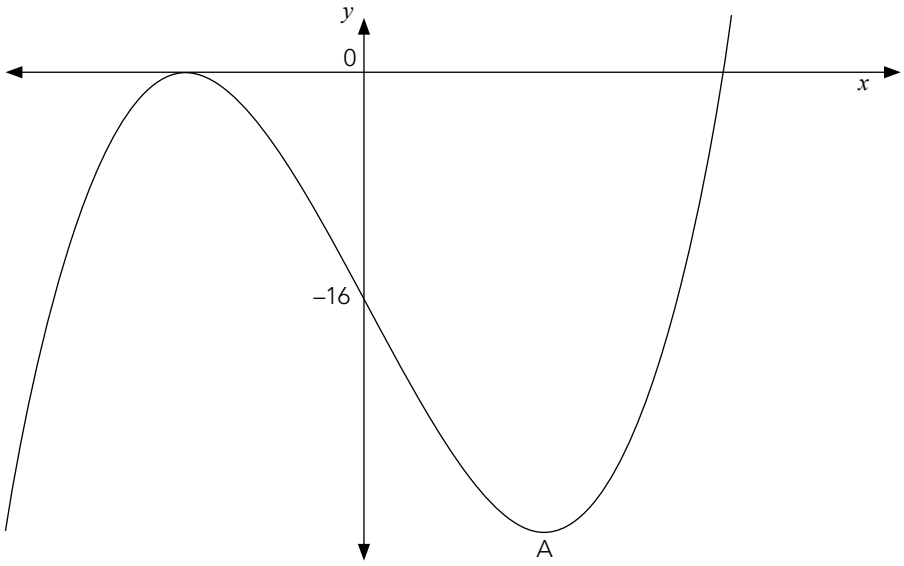
1.5 Determine $D_x\left[\frac{x^2 - 4x + 3}{2x}\right]$ (leave answers with positive exponents). (4)

[18]

QUESTION 2

The sketch below represents the curve of $f(x) = ax^3 + bx^2 + cx + d$.

The curve has x-intercepts at –2 and 4. The y-intercept is –16.



2.1 Show that $a = 1$, $b = 0$, $c = -12$ and $d = -16$. (5)

2.2 Find the equation of the tangent to the curve at $x = 0$. (3)

2.3 If A(2;–32) is the local minimum, for which values of x is $f(x)$. $f'(x) \leq 0$. (3)

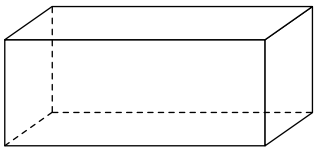
2.4 For which value(s) of x is $f(x)$ concave down? (2)

2.5 Name the function which represents the gradient graph of f. (1)

[14]

QUESTION 3

A rectangular container, made of sheet metal, with no lid, has a length of $2x$ cm, a breadth of x cm and a height of h cm.



3.1 Give an expression in terms of x and h for the total surface area of sheet metal needed to make the container. (3)

3.2 If the total surface area is 600 cm^2, show that $h = \frac{600 - 2x^2}{6x}$ cm. (3)

3.3 Determine the volume of the container in terms of x. (4)

3.4 Determine the value of x and the volume of the largest possible container which can be made with exactly 600 cm^2 of sheet metal. (6)

[16]

QUESTION 4

A stone is thrown vertically upwards. The height of the stone after t seconds is given by the equation $h = 18t - 4t^2$ metres. What is the initial velocity of the stone?

[2]

QUESTION 5

5.1 5.1.1 Expand $\cos(A + B)$ (1)

5.1.2 Prove that $\cos(45° + x).\cos(45° - x) = \frac{1}{2}\cos 2x$ (4)

5.1.3 Hence, without the use of a calculator, determine the value of $\cos 75° \cos 15°$. (2)

5.2 Given $\sin 19° = p$, determine the following in terms of p:

5.2.1 $\cos 161°$ (3)

5.2.2 $\sin(-38°)$ (2)

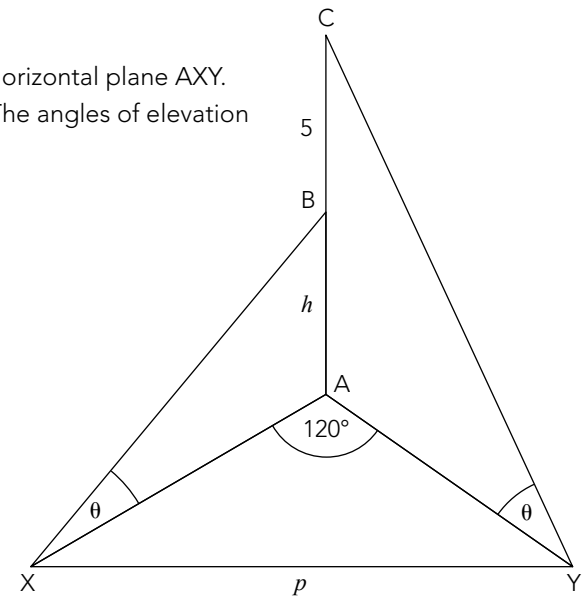
5.3 Prove that $\frac{1 - \cos 2x - \sin x}{\sin 2x - \cos x} = \tan x$ (4)

5.4 Solve for α: $5\sin^2\alpha - \sin 2\alpha - 7\cos^2\alpha = 0$. (6)

[22]

QUESTION 6

In the diagram AC is a vertical tower on the horizontal plane AXY. B is a point on CA such that BC = 5 metres. The angles of elevation of both B and C are θ.



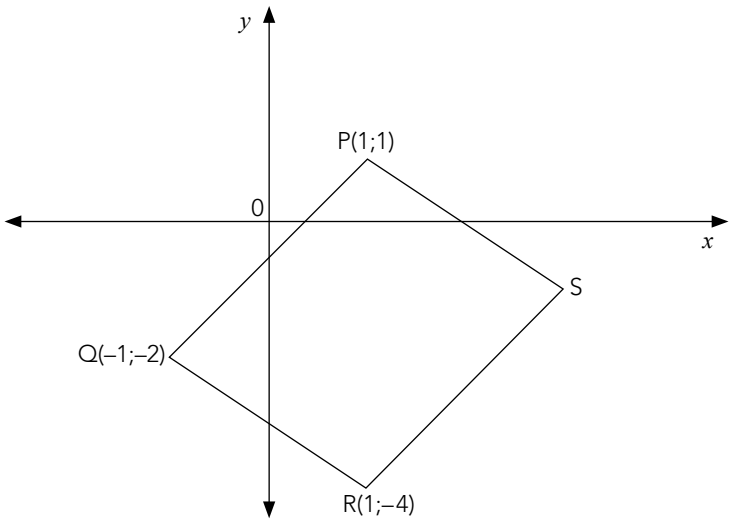
6.1 Express XY^2 in terms of AX and AY. (2)

6.2 If AB = h and XY = p, prove that $p^2 = \frac{3h^2 + 15h + 25}{\tan^2\theta}$ (6)

[8]

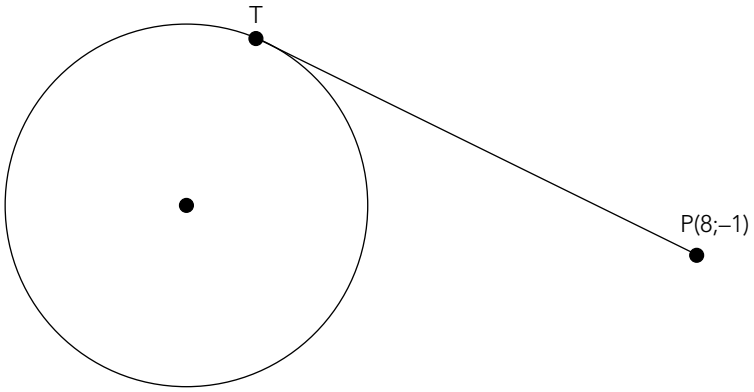
QUESTION 7

7.1 Refer to the sketch below. Points P(1;1), Q(–1;–2), and R(1;–4) are given.
PQRS is a parallelogram.



Determine the coordinates of point S. (4)

7.2 The equation of a circle in the Cartesian Plane is $x^2 + y^2 + 6x - 2y - 15 = 0$ with centre R.



7.2.1 What is the relationship between a tangent to a circle at a point and the radius of that circle drawn from the same point of contact? (1)

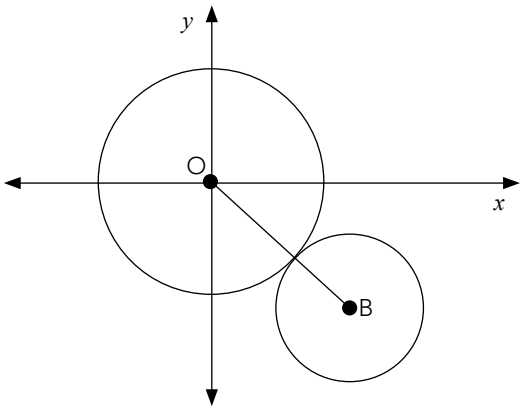
7.2.2 Determine the centre and the radius of the circle by rewriting the equation in the form $(x - p)^2 + (y - q)^2 = r^2$. (4)

7.2.3 Calculate the length of the tangent drawn to the circle from P(8;–1). (5)

[14]

QUESTION 8

In the diagram below, two circles are drawn. Circle with centre O touches the circle with centre B externally. The equation of the circle with centre O is given by $x^2 + y^2 = 45$.
The equation of the circle with centre B is given by $(x - 2p)^2 + (y + p)^2 = 20$.



Determine the value of p. **[6]**

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

Note: The last column in the memorandum shows the cognitive level for each question in the test.

The levels are:
K: Knowledge – straight recall of facts.
R: Routine procedures – well-known, simple applications and calculations.
C: Complex procedures – procedures involving complex calculations and/or higher reasoning.
P: Problem solving – solving problems for which higher order reasoning and processes are involved.

More information about these levels can be found in the CAPS (p. 53).

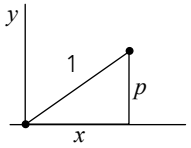
A suggestion for test and exam marking:

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.

SOLUTIONS	MARKS	COGNITIVE LEVELS
QUESTION 1		
1.1 $f(x) = x^3 + dx^2 - x + 5$ $f(2) = 23$ ✓ $2^3 + d(2)^2 - 2 + 5 = 23$ ✓ $8 + 4d + 3 = 23$ ✓ $4d = 23 - 11$ $4d = 12$ $d = 3$ ✓	(4)	RP
1.2 Determine $\lim_{x \to 3} \frac{3x^2 - 27}{x - 3}$ $= \lim_{x \to 3} \frac{3(x^2 - 9)}{x - 3}$ $= \lim_{x \to 3} \frac{3(x - 3)(x + 3)}{x - 3}$ ✓ $= \lim_{x \to 3} 3(x + 3)$ ✓ $= 18$ ✓	(3)	RP
1.3 $f(x) = 2x^2 + 3$ $f'(x) = \lim_{h \to 0} \frac{f(x + h) - f(x)}{h}$ $= \lim_{h \to 0} \frac{2(x + h)^2 + 3 - (2x^2 + 3)}{h}$ ✓ $= \lim_{h \to 0} \frac{2(x^2 + 2xh + h^2) + 3 - (2x^2 - 3)}{h}$ $= \lim_{h \to 0} \frac{2x^2 + 4xh + 2h^2 + 3 - 2x^2 - 3}{h}$ $= \lim_{h \to 0} \frac{4xh + 2h^2}{h}$ ✓ $= \lim_{h \to 0} \frac{h(4x + 2h)}{h}$ ✓ $= \lim_{h \to 0} (4x + 2h)$ ✓ $= 4x$ ✓	(5)	RP

SOLUTIONS	MARKS	COGNITIVE LEVELS
1.4 $P - 2v = v^3$ $P = 2v + v^3$ ✓ $\frac{dP}{dv} = 2 + 3v^2$ ✓	(2)	RP
1.5 $D_x\left[\frac{2x^2 - 4x + 3}{2x}\right]$ $= D_x\left[\frac{x^2}{2x} - \frac{4x}{2x} + \frac{3}{2x}\right]$ ✓ $= D_x\left[\frac{x}{2} - 2 + \frac{3x^{-1}}{2}\right]$ ✓ $= \frac{1}{2} - \frac{3x^{-2}}{2}$ ✓ $= \frac{1}{2} - \frac{3}{2x^2}$ ✓	(4)	RP
QUESTION 2		
2.1 $y = a(x + 2)(x + 2)(x - 4)$ ✓ Subs. (0; –16): $-16 = a(0 + 2)(0 + 2)(0 - 4)$ ✓ $-16 = a(-16)$ $1 = a$ ✓ $\therefore y = 1(x + 2)(x + 2)(x - 4)$ $y = 1(x + 2)(x^2 - 2x - 8)$ $y = x^3 - 2x^2 - 8x + 2x^2 - 4x - 16$ $y = x^3 - 12x - 16$ ✓ $\therefore a = 1, b = 0, c = -12, d = -16$ ✓	(5)	RP
2.2 At $x = 0, y = -16$ (0; –16) ✓ $f(x) = x^3 - 12x - 16$ $\therefore f'(x) = 3x^2 - 12$ $f'(0) = 3(0)^2 - 12$ $= -12$ ✓ $\therefore$ gradient of tangent: –12 Equation of tangent: $y = -12x - 16$ (y-int. –16) ✓	(3)	RP
2.3 $f(x).f'(x) \leq 0$ for $x \in (-\infty;-2] \cup [2;4]$ ✓ ✓✓	(3)	PS
2.4 Point of inflection: $f''(x) = 0$ $\therefore 6x = 0$ $x = 0$ ✓ $\therefore$ Concave down for $x \in (-\infty;0)$ ✓	(2)	CP
2.5 The parabola. ✓	(1)	K

SOLUTIONS	MARKS	COGNITIVE LEVELS
QUESTION 3		
3.1 Surface area: S.A. $= 2(2x)(h) + 2x(x) + 2(x)(h)$ ✓✓ $= 4xh + 2x^2 + 2xh$ $= 6xh + 2x^2$ ✓	(3)	RP
3.2 S.A. = 600 $\therefore 6xh + 2x^2 = 600$ ✓ $6xh = 600 - 2x^2$ ✓ $\therefore h = \frac{600 - 2x^2}{6x}$ ✓	(3)	RP
3.3 Volume: $V = l \times b \times h$ $= (2x)(x)(h)$ ✓ $= 2x^2.\frac{600 - 2x^2}{6x}$ ✓ $= \frac{x(600 - 2x^2)}{3}$ $= \frac{600x - 2x^3}{3}$ ✓ $= 200x - \frac{2}{3}x^3$ ✓	(4)	CP
3.4 For maximum volume: $V'(x) = 0$ ✓ $\therefore \quad 200 - 2x^2 = 0$ ✓ $2x^2 = 200$ $x^2 = 100$ $x = \pm 10$ ✓ Max. vol. at $x = 10$ ✓ (Note: There are various checks to verify a max. at this point: shape of Volume function/y-values/ double derivative at $x = 10$) Substitute $x = 10$: $V = 200(10) - \frac{2}{3}(10)^3$ ✓ $V = 2\,000 - \frac{2}{3}(1\,000)$ $= \frac{4\,000}{3} = 133\frac{1}{3}$ cm^3 ✓	(6)	RP
QUESTION 4		
$h = 18t - 4t^2$ $v = h'(t) = 18 - 8t$ ✓ subs. $t = 0$: $h'(0) = 18 - 8(0)$ =18 m/sec. (or m.sec^{-1}) ✓	(2)	RP

SOLUTIONS	MARKS	COGNITIVE LEVELS
QUESTION 5		
5.1.1 $\cos(A+B) = \cos A\cos B - \sin A\sin B$ ✓	(1)	K
5.1.2 LHS: $\cos(45° + x).\cos(45° - x)$ RHS: $\frac{1}{2}\cos 2x$		
$= (\cos 45°\cos x - \sin 45°.\sin x)(\cos 45°\cos x + \sin 45°\sin x)$ ✓		
$= (\frac{\sqrt{2}}{2}\cos x - \frac{\sqrt{2}}{2}\sin x)(\frac{\sqrt{2}}{2}\cos x + \frac{\sqrt{2}}{2}\sin x)$ ✓		
$= \frac{2}{4}\cos^2 x - \frac{2}{4}\sin^2 x$ ✓		
$= \frac{1}{2}\cos^2 x - \frac{1}{2}\sin^2 x$		
$= \frac{1}{2}(\cos^2 x - \sin^2 x)$ ✓		
$= \frac{1}{2}\cos 2x$ $\therefore$ LHS = RHS	(4)	CP
5.1.3 Let $x = 30°$		
then $\cos 75°\cos 15° = \cos(45° + 30°)\cos(45° - 30°)$ ✓		
$= \frac{1}{2}\cos(2(30°))$		
$= \frac{1}{2}\cos 60°$		
$= \frac{1}{2}(\frac{1}{2}) = \frac{1}{4}$ ✓	(2)	PS
5.2 $\sin 19° = p$		
5.2.1 $\cos 161°$		
$= \cos(180° - 19°)$ 		
$= -\cos 19°$ ✓		
$= -\frac{\sqrt{1-p^2}}{1}$		
$= -\sqrt{1-p^2}$ ✓ By Pyth. $x^2 + p^2 = 1^2$ ✓		
$x = \sqrt{1-p^2}$	(3)	CP
5.2.2 $\sin(-38°)$		
$= -\sin 38°$ ✓		
$= -2\sin 19°\cos 19°$ ✓		
$= -2p\sqrt{1-p^2}$ ✓	(2)	RP

SOLUTIONS	MARKS	COGNITIVE LEVELS
5.3 LHS: $\frac{1-\cos 2x-\sin x}{\sin 2x-\cos x}$ RHS: $\tan x$ $=\frac{1-\cos 2x-\sin x}{\sin 2x-\cos x}$ ✓ $=\frac{1-(1-2\sin^2 x)-\sin x}{2\sin x\cos x-\cos x}$ ✓ $=\frac{2\sin^2 x-\sin x}{2\sin x\cos x-\cos x}$ $=\frac{\sin x(2\sin x-1)}{\cos x(2\sin x-1)}$ ✓ $=\frac{\sin x}{\cos x}$ ✓ $=\tan x$ $\therefore$ LHS = RHS	(4)	CP
5.4 $5\sin^2\alpha-\sin 2\alpha-7\cos^2\alpha=0$ $5\sin^2\alpha-2\sin\alpha\cos\alpha-7\cos^2\alpha=0$ ✓ $(5\sin\alpha-7\cos\alpha)(\sin\alpha+\cos\alpha)=0$ ✓ $5\sin\alpha-7\cos\alpha=0$ or $\sin\alpha=-\cos\alpha$ ✓ $5\sin\alpha=7\cos\alpha$ or $\sin\alpha=-\cos\alpha$ $\frac{\sin\alpha}{\cos\alpha}=\frac{7}{5}$ or $\frac{\sin\alpha}{\cos\alpha}=-1$ $\tan\alpha=\frac{7}{5}$ or $\tan\alpha=-1$ ✓ $\alpha=54.46°+k.180°$ ✓ or $\alpha=135°+k.360°$ $k\epsilon Z$ ✓	(6)	CP
QUESTION 6		
6.1 $XY^2=AX^2+AY^2-2AX.AY\cos 120°$ ✓ $=AX^2+AY^2+2AX.AY\cos 60°$ $=AX^2+AY^2+2AX.AY.\frac{1}{2}$ $=AX^2+AY^2+AX.AY$ ✓	(2)	RP
6.2 In $\triangle ABX$: $\tan\theta=\frac{h}{AX}$ ✓and in $\triangle ACY$: $\tan\theta=\frac{5+h}{AY}$ ✓ In $\triangle AXY$: $XY^2=AX^2+AY^2+AX.AY$ from 6.1 $p^2=\frac{h^2}{\tan^2\theta}+\frac{(h+5)^2}{\tan^2\theta}+\frac{h}{\tan\theta}.\frac{h+5}{\tan\theta}$ ✓✓ $p^2=\frac{h^2+h^2+10h+25+h^2+5h}{\tan^2\theta}$ ✓ $p^2=\frac{3h^2+15h+25}{\tan^2\theta}$ ✓	(6)	PS

SOLUTIONS	MARKS	COGNITIVE LEVELS
QUESTION 7		
7.1 Join PR and QS.		
Midpoint of PR $(\frac{1+1}{2};\frac{1-4}{2}) = (1;-\frac{3}{2})$ ✓		
Let $S(x;y)$		
$(1;-\frac{3}{2}) = (\frac{x-1}{2};\frac{y-2}{2})$ (diagonals of parm. bisect each other)		
$1 = \frac{x-1}{2}$ $\quad -\frac{3}{2} = \frac{y-2}{2}$ ✓		
$2 = x - 1$ $\quad -3 = y - 2$		
$3 = x$ ✓ $\quad -1 = y$ ✓		
$\therefore$ S(3;–1)	(4)	RP
7.2.1 The tangent is perpendicular to the radius at the point of contact. ✓	(1)	K
7.2.2 $x^2 + y^2 + 6x - 2y - 15 = 0$		
$x^2 + 6x + 3^2 + y^2 - 2y + 1^2 = 15 + 3^2 + 1^2$		
$(x + 3)^2 + (y - 1)^2 = 25$ ✓✓		
Centre: (–3;1) ✓ Radius: 5 ✓	(4)	RP
7.2.3 Join T to R and P to R.		
$PR^2 = (-3 - 8)^2 + (1 + 1)^2$ ✓		
$= 121 + 4$		
$= 125$ ✓		
$\widehat{T} = 90°$ (tan. perp. to radius)		
$TR^2 + PT^2 = PR^2$ (Theorem of Pythagoras) ✓		
$25 + PT^2 = 125$		
$PT^2 = 125 - 25$ ✓		
$PT^2 = 100$		
$PT = \sqrt{100} = 10$ units (PT > 0) ✓	(5)	CP

SOLUTIONS	MARKS	COGNITIVE LEVELS
QUESTION 8 Let r_1 and r_2 be the radii of the two circles, centre the origin and centre B respectively. OB = $r_1 + r_2$ ✓ (for circles to touch) $\sqrt{(2p-0)^2 + (-p-0)^2} = \sqrt{45} + \sqrt{20}$ ✓ $\sqrt{(4p^2 + p^2} = 3\sqrt{5} + 2\sqrt{5}$ ✓ $\sqrt{(5p^2} = 5\sqrt{5}$ $\therefore 5p^2 = 25(5)$ ✓ (squaring both sides) $p^2 = 25$ $\therefore \quad p = \pm 5$ ✓ $\therefore \quad p = 5$ (in quadrant IV) ✓	(6)	PS

7. 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 above. 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, this is the case as the two lower levels together account for 55% of the marks, and the two higher for 45%.

Cognitive level	Mark out of 100	Percentage of marks in the test	Percentage of marks at each level prescribed by the CAPS (p. 53)
Knowledge (K)	3	3%	≈ 20%
Routine Procedures (RP)	52	52%	≈ 35%
Complex Procedures (CP)	28	28%	≈ 30%
Problem Solving (PS)	17	17%	≈ 15%

8. The exemplar Term 2 Euclidean geometry test

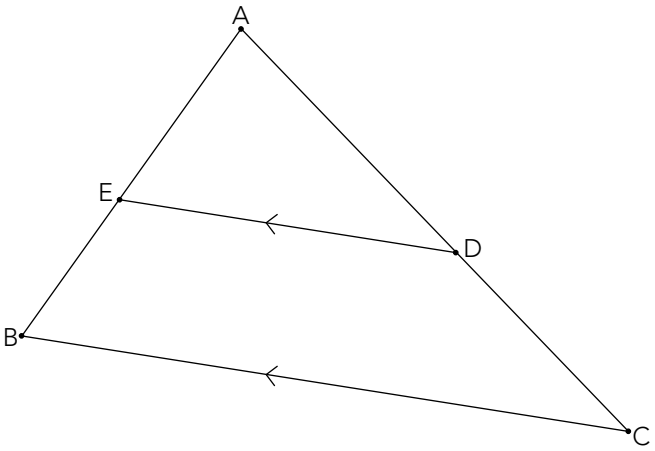
Time: 60 minutes
Total: 50 marks

Each learner to receive a copy of the sheet of formulae for use during the test.

INSTRUCTIONS TO LEARNERS:

1. There are two large questions. Answer questions on this paper.
2. Show all your working.
3. Diagrams are not drawn to scale.
4. Scientific non-programmable calculators may be used.
5. Write neatly and legibly.

QUESTION 1



1.1 In the diagram above, ED||BC.

AE = 4 units.

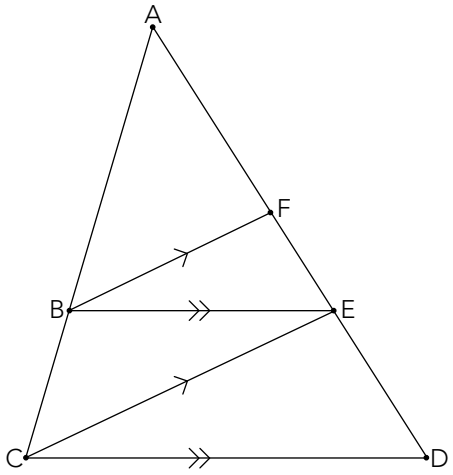
EB = x units.

AD = $2x + 1$ units.

DC = 2,5 units.

Determine the value of x. (5)

1.2 In the diagram, BE||CD and BF||CE. AB = 10 mm, BC = 5 mm and DE = 6 mm.



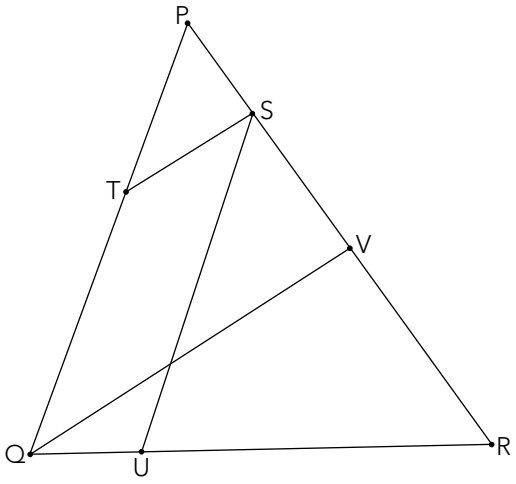
1.2.1 Calculate, with reasons, the length EF. (5)

1.2.2 Determine the value of the ratio: $\frac{\text{Area } \triangle ABF}{\text{Area } \triangle EBF}$ (4)

1.3

1.3.1 State the converse of the theorem which states that:
"If a line joining two points on two sides of a triangle is parallel to the third side of the triangle, then that line divides the two sides proportionally" (2)

1.3.2



In the diagram, TS||QV. PT = 40 cm,

TQ = 60 cm,

QU = 20 cm and

UR = 80 cm.

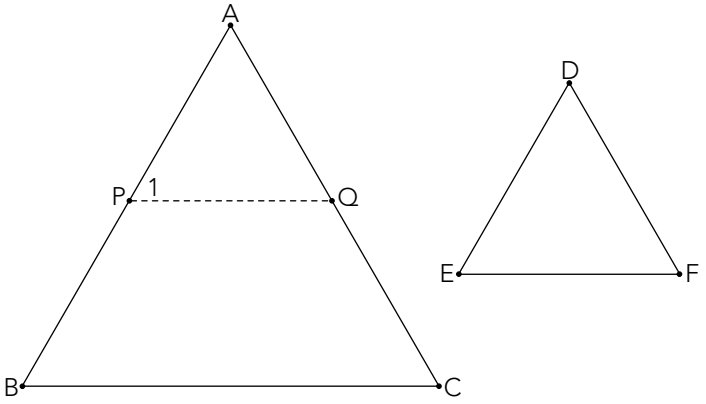
V is the midpoint of PR.

Prove that SU||PQ. (7)

[23]

QUESTION 2

2.1 Complete the proof of the theorem which states that equiangular triangles are similar:



Given: $\triangle ABC$ and $\triangle DEF$ with $\hat{A} = \hat{D}$, $\hat{B} = \hat{E}$ and $\hat{C} = \hat{F}$

Prove: $\triangle ABC ||| \triangle DEF$

Proof:

Construction: On AB, mark off AP = _____ and on AC, mark off _____.

Draw PQ.

In $\triangle APQ$ and $\triangle DEF$:

_____	(construction)
_____	(given)
AQ = DF	(construction)
$\triangle APQ \equiv \triangle DEF$	(_____)
$\therefore$ _____	(congruent $\triangle$s)
But $\hat{B} = \hat{E}$	(_____)

$\therefore \hat{P}_1 = \hat{B}$

But these are corresponding angles

$\therefore$ _____

$\therefore \frac{AP}{AB} = \frac{AQ}{AC}$ (_____)

But AP = DE and AQ = DF (construction)

$\therefore$ — = —

Similarly, by marking BX = DE on AB and BY = EF on BC, we can prove that:

$\frac{DE}{AB} = \frac{EF}{BC}$

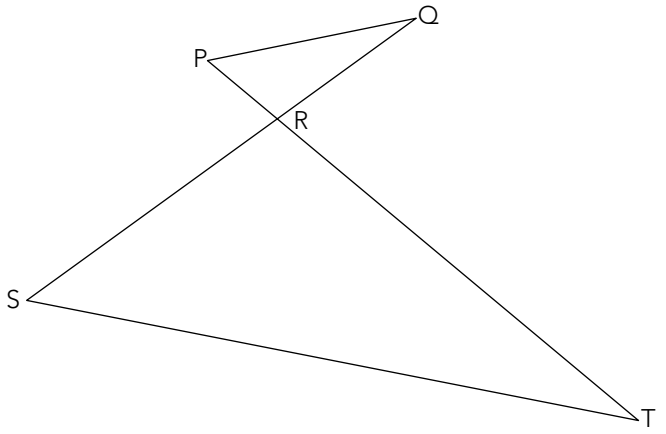
$\therefore \frac{DE}{AB} = \frac{EF}{BC} = \frac{DF}{AC}$

But the triangles are equiangular

$\therefore \triangle ABC ||| \triangle DEF$ (5)

2.2 In the figure shown, $\triangle PQR ||| \triangle STR$ with $\hat{P} = \hat{S}$ and $\hat{Q} = \hat{T}$.

$\hat{P} = x$, $\hat{S} = 2x - 60°$ and $\hat{T} = 40°$

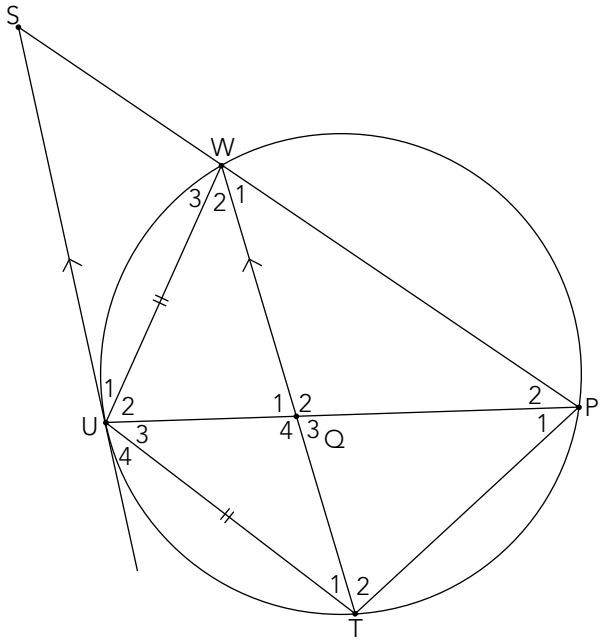


Calculate $P\hat{R}Q$ (5)

2.3 In the diagram below, WPTU is a cyclic quadrilateral with UW = UT.

Chords WT and PU intersect at Q.

PW extends to S such that SU||WT.



2.3.1 Complete the statement: The angle between the tangent to a circle and the chord drawn from the point of contact is. (1)

_____

_____

2.3.2 Prove that:

(a) US is a tangent to circle PWUT at U. (5)

_____

_____

_____

_____

(b) $\triangle SPU|||\triangle SUW$ (4)

_____

_____

_____

_____

(c) $SU^2 = SP.SW$ (2)

_____

_____

_____

_____

(d) $SU^2.QU = PU.SW^2$ (5)

_____

_____

_____

_____

[**27**]

9. Memorandum and analysis of cognitive levels in the Term 2 Euclidean geometry test

Note: The last column in the memorandum shows the cognitive level for each question in the test. The levels are:

K	Knowledge – straight recall of facts.
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C	Complex procedures – procedures involving complex calculations and/or higher reasoning.
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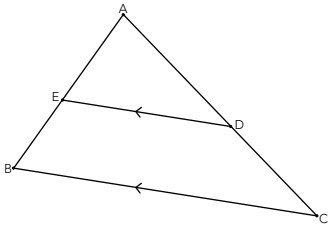
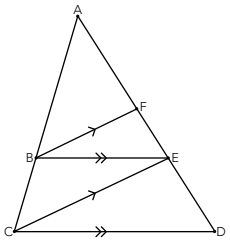
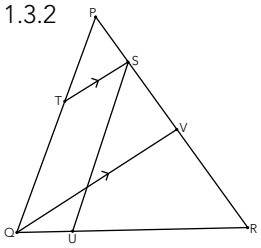
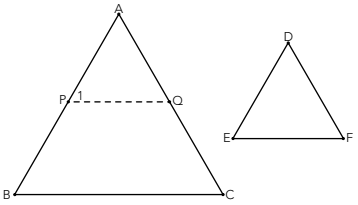
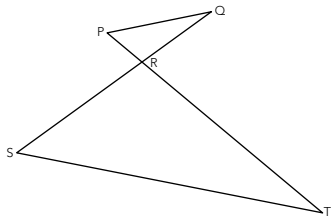
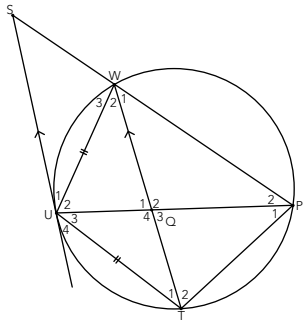
SOLUTIONS		MARKS	COGNITIVE LEVELS
QUESTION 1			
			
1.1 ED||BC	(Given)		
$\therefore \frac{AE}{EB} = \frac{AD}{DC}$	(Line || one side of △) ✓✓ Statement and reason (s and r)		
i.e. $\frac{4}{x} = \frac{2x+1}{2,5}$			
$4 \times 2,5 = x(2x + 1)$	✓ (Algebraic equation)		
$10 = 2x^2 + x$			
$0 = 2x^2 + x - 10$			
$0 = (2x + 5)(x - 2)$			
$\therefore x = -\frac{5}{2}$ or $x = 2$	✓ (Answers)		
$\therefore x = 2$	✓ (Accepted solution)	(5)	**R**

SOLUTIONS	MARKS	COGNITIVE LEVELS
1.2 		
1.2.1 In △ABC:		
BE||CD (Given)		
$\therefore \frac{AE}{ED} = \frac{AB}{BC}$ (Line || one side of △) ✓ (s and r)		
$= \frac{10}{5}$ (Given)		
$= \frac{2}{1}$ ✓ (Value)		
$\therefore \frac{AE}{6} = \frac{2}{1}$ (ED = 6 units – given)		
AE = 12 units ✓ (Value)		
In △ACE:		
BF||CE (Given)		
$\therefore \frac{EF}{AE} = \frac{CB}{AC}$ (Line || one side of △) ✓ (s and r)		
$\frac{EF}{12} = \frac{5}{15}$		
$\therefore EF = \frac{5}{15} \times 12 \ldots(1)$ ✓ (Value)		
= 4 units	(5)	**R**
1.2.2		
AF = AE – FE		
= 12 – 4		
= 8 units		
$\frac{\text{Area } \triangle ABF}{\text{Area } \triangle EBF}$		
$\frac{\frac{1}{2}AF \times h}{\frac{1}{2}FE \times h} = \frac{AF}{FE} = \frac{8}{4} = \frac{2}{1}$ ✓✓ (Areas) ✓✓ (Value ratio)	(4)	**C**
1.3.1 If a line divides two sides of a triangle proportionally, then that line is parallel to the third side. ✓✓ (Statement)	(2)	**K**

SOLUTIONS	MARKS	COGNITIVE LEVELS
1.3.2 		
TS||QV (Given)		
$\therefore \frac{PS}{SV} = \frac{PT}{PQ}$ (Line || one side of $\triangle$) ✓ (s and r)		
$= \frac{40}{60}$		
$= \frac{2}{3}$ ✓ (Value of ratio)		
Let PS = $2k$, SV = $3k$		
$\therefore$ RV = $5k$ (PV = RV) ✓ (Value of RV in terms of PS and SV)		
$\therefore \frac{RS}{PS} = \frac{RV + SV}{PS} = \frac{5k + 3k}{2k}$		
$= \frac{8k}{2k}$		
$= \frac{4}{1}$ ✓ (Value)		
BUT $\frac{RU}{UQ} = \frac{80}{20} = \frac{4}{1}$ (Given) ✓ (Ratio)		
$\therefore \frac{RS}{PS} = \frac{RU}{UQ}$ $(= \frac{4}{1})$ ✓		
$\therefore$ SU||PQ (Line divides two sides of $\triangle$ in prop.) ✓ (Conclusion and reason)	(7)	**P**

SOLUTIONS	MARKS	COGNITIVE LEVELS
QUESTION 2:		
2.1 		
NOTE: Each fill in is worth half a mark		
Construction: On AB, mark off AP = **DE** ✓ and on AC, mark off **AQ = DF**. ✓		
Draw PQ.		
In △APQ and △DEF		
AP = DE ✓ (Construction)		
$\hat{A} = \hat{D}$ ✓ (Given)		
AQ = DF (Construction)		
△APQ≡△DEF (**Side, Angle, Side)** ✓		
∴ $\hat{P}_1 = \hat{E}$ ✓ (Congruent △s)		
But $\hat{B} = \hat{E}$ (**Given**) ✓		
∴ $\hat{P}_1 = \hat{B}$		
But these are corresponding angles		
∴ **PQ||BC** ✓		
∴ $\frac{AP}{AB} = \frac{AQ}{AC}$ **(Line || one side of △s)** ✓		
But AP = DE and AQ = DF (Construction)		
∴ $\frac{DE}{AB} = \frac{DF}{AC}$ ✓		
Similarly, by marking BX = DE on AB and BY = EF on BC, we can prove that:		
$\frac{DE}{AB} = \frac{EF}{BC}$		
∴ $\frac{DE}{AB} = \frac{EF}{BC} = \frac{DF}{AC}$		
But the triangles are equiangular	(5) (half a mark for each fill in)	**K**
∴ △ABC|||△DEF		

SOLUTIONS	MARKS	COGNITIVE LEVELS
2.2 		
$\hat{P} = \hat{S}$ ✓ (Similar triangles – given)		
$\therefore x = 2x - 60°$		
$-x = -60°$		
$x = 60°$ ✓ (Value)		
$\therefore \hat{Q} = \hat{T} = 40°$ (Similar triangles – given) ✓ (Value)		
In △PRQ:		
$60° + 40° + P\hat{R}Q = 180°$ (Sum of angles in triangle) ✓ (Reason)		
$P\hat{R}Q = 180° - 100°$		
$= 80°$ ✓ (Value)	(5)	**C**
2.3 		
2.3.1 …equal to the angle subtended in the alternate segment. ✓ (Statement)	(1)	**K**

SOLUTIONS			MARKS	COGNITIVE LEVELS
2.3.2	(a) UW = UT	(Given)		
	$\therefore \hat{W}_2 = \hat{T}_1$	(Angles opp. equal sides) ✓ (s and r)		
	But $\hat{W}_2 = \hat{U}_1$	(WT||SU; alt. angles) ✓✓ (s and r)		
	$\therefore \hat{U}_1 = \hat{T}_1$	✓ (Conclusion)		
	∴ US is a tangent	(Converse tan chord theorem) ✓ (Reason)	(5)	**P**
	(b) In △SPU and △SUW:			
	1) $\hat{S}$ is common	✓ (Statement)		
	2) $\hat{P}_2 = \hat{U}_1$	(Tan chord theorem) ✓ (s and r)		
	3) $\hat{U}_1 + \hat{U}_2 = \hat{W}_3$	(Sum of <'s in △) ✓ (s and r)		
	∴ △SPU|||△SUW	(Equiangular triangles) ✓ (s and r)	(4)	**R**
	(c) △SPU|||△SUW	(Proved)		
	$\therefore \frac{SU}{SW} = \frac{SP}{SU}$	(||| △s) ✓ (s and r)		
	$SU^2 = SP.SW$	✓ (No mark if only write conclusion)	(2)	**R**
	(d) In △PSU:			
	$\frac{PU}{QU} = \frac{PS}{SW}$	(Line || one side △) ✓ (s and r)		
	∴ PU.SW = PS.QU			
	$\frac{PU.SW}{PS} = QU$	✓ (Simplification)		
	$SU^2 = SP.SW$	(Proved)		
	$\therefore SU^2.QU = SP.SW.QU$	✓ (Multiply both sides by same value)		
	$\therefore SU^2.QU = SP.SW.\frac{PU.WS}{PS}$	✓ (substitution for QU)		
	$SU^2.QU = PU.SW^2$	✓ (Cancellation)	(5)	**P**

10. Weighting of cognitive levels in the Term 2 Euclidean geometry test

The table below shows the weighting of marks across the cognitive levels in the exemplar test provided above. 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 48% of the marks, and the two higher for 52%.

Cognitive level	Mark out of 50	Percentage of marks in the test	Percentage of marks at each level prescribed by the CAPS (p. 53)
Knowledge (K)	14	16%	≈ 20%
Routine Procedures (RP)	18	32%	≈ 35%
Complex Procedures (CP)	5	18%	≈ 30%
Problem Solving (PS)	13	34%	≈ 15%

11. The exemplar Term 2 sequences and algebraic functions test

Time: 60 minutes
Total: 50 marks

Each learner to receive a copy of the sheet of formulae for use during the test.

INSTRUCTIONS TO LEARNERS:

1. There are five questions. Answer all questions on your answer paper.
2. Show all your working.
3. Diagrams are not drawn to scale.
4. Scientific non-programmable calculators may be used.
5. Number the questions according to the numbering system used in this question paper.
6. Write neatly and legibly.

QUESTION 1

1.1 The following sequence has the property that the sequence of numerators is arithmetic and the sequence of denominators is geometric: $\frac{-5}{1}$; $\frac{1}{3}$; $\frac{7}{9}$; …

1.1.1 Write down the 4th term of the sequence. (1)

1.1.2 Determine a formula for the n^{th} term. (3)

1.2 Given the arithmetic sequence: $w + 5$; $2w + 3$; $w - 7$; …

1.2.1 Determine the value of w. (3)

1.2.2 Write down the common difference of this sequence. (2)

1.3 Given the sequence: 4 ; 5 ; 8 ; 13 ; 20 ; …

1.3.1 Determine a formula for the n^{th} term. (4)

1.3.2 The sequence of first differences of the quadratic sequence forms an arithmetic sequence. Determine S_{20} the sum of the first twenty terms of the arithmetic sequence of first differences. (4)

[17]

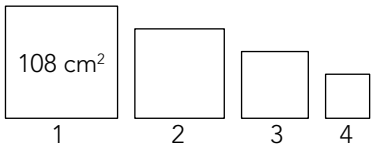
QUESTION 2

2.1 Determine n:

$$\sum_{x=1}^{n} \frac{1}{12}(7^x) = \frac{960\,799}{12}$$ (6)

2.2 For which value(s) of x will the series $3(2x + 1) + 3(2x + 1)^2 + 3(2x + 1)^3 + \ldots$ converge? (3)

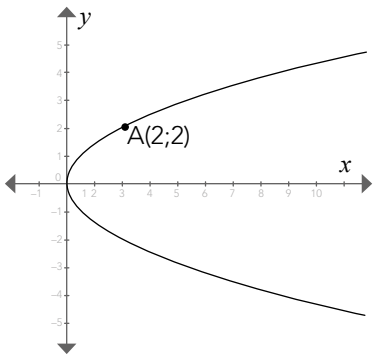
2.3 An infinite number of rectangles are formed. The area of the first rectangle is 108 cm^2. Each subsequent rectangle has an area 20% less than the previous one.



Find the **total possible area** of all the rectangles added together. Show all working clearly. (5)

[14]

QUESTION 3



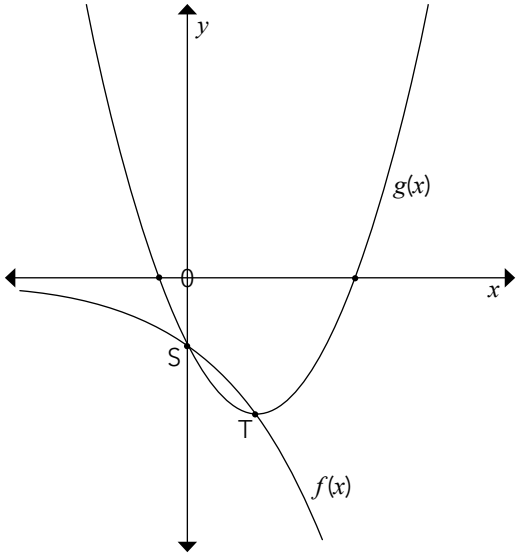
3.1 Determine the equation of the inverse of the graph above. (3)

3.2 Is this inverse a function or not? Explain. (1)

[4]

QUESTION 4

Sketched below are the graphs of $f(x) = -2^x$ and $g(x) = (x - 1)^2 - 2$.
Graphs f and g intersect at S and T, where S is on the y-axis and T is the turning point of g.



4.1 For what values of x is $g(x) - f(x) > 0$? (2)

4.2 Write down the equation of $f^{-1}(x)$ in the form $y = \ldots$ (2)

4.3 Sketch the graph of $f^{-1}(x)$, indicating the x-intercept and the co-ordinates of one other point. (3)

4.4 About which line are the graphs of $f(x)$ and $f^{-1}(x)$ symmetrical? (1)

4.5 Give one way in which the domain of g can be restricted, without affecting the range, so that g^{-1} will be a function. (1)

4.6 Give the equation of k if $k(x)$ is the image of $f(x)$ after it has been reflected across the x-axis and then shifted 3 units down. (2)

[11]

QUESTION 5

A researcher described the rat population of a large city by the equation: $y = 54(2{,}7183)^{0{,}12t}$
where t is the time measured in years since 1988 and y is the number of rats in millions.

5.1 What was the rat population in 1988 when the research started? (1)

5.2 How many years will it take for the rat population to climb to 671 000 000? (3)

[4]

12. Memorandum and analysis of cognitive levels in the Term 2 sequences and algebraic functions test

Note: The last column in the memorandum shows the cognitive level for each question in the test. The levels are:

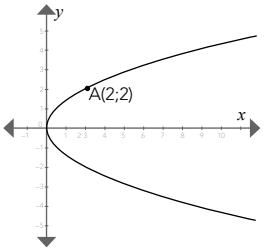
K	Knowledge – straight recall of facts.
R	Routine procedures – well-known, simple applications and calculations.
C	Complex procedures – procedures involving complex calculations and/or higher reasoning.
P	Problem solving – solving problems for which higher order reasoning and processes are involved.
More information about these levels can be found in the CAPS (p. 53).	

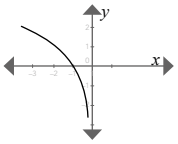
A suggestion for test and exam marking

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.

SOLUTIONS		MARKS	COGNITIVE LEVELS
QUESTION 1			
1.1.1 $T_4 = \frac{13}{27}$	✓ answer	(1)	**R**
1.1.2 Numerator: $T_n = a + (n-1)d$ $= -5 + (n-1)6$ $= -5 + 6n - 6$ $= 6n - 11$	✓ numerator		
Denominator: $T_n = ar^{n-1}$ $= 1(3)^{n-1}$ $= 3^{n-1}$ $\therefore T_n = \frac{6n-11}{3^{n-1}}$	✓ denominator ✓ denominator ✓ answer	(3)	**R**
1.2.1 $T_2 - T_1 = T_3 - T_2$	✓ common difference formula		
$2w + 3 - (w + 5) = (w - 7) - (2w + 3)$ $2w + 3 - (w + 5) = w - 7 - (2w + 3)$ $w - 2 = -w - 10$ $2w = -8$ $\therefore w = -4$	✓ simplification ✓ answer	(3)	**R**
1.2.2 $T_1 = -4 + 5$ $= 1$			
$T_2 = 2(-4) + 3$ $= -8 + 3$ $= -5$	✓		
$\therefore d = -6$	✓ answer	(2)	**R**

SOLUTIONS		MARKS	COGNITIVE LEVELS
1.3.1	$2a = 2$ $a = 1$ ✓ answer $3a + b = 1$ $3(1) + b = 1$ $b = 1 - 3$ $b = -2$ ✓ answer $a + b + c = 4$ $1 - 2 + c = 4$ $-1 + c = 4$ $c = 5$ ✓ answer $\therefore T_n = n^2 - 2n + 5$ ✓ final formula	(4)	**R**
OR	$T_n = an^2 + bn + c$ $2a = 2$ $\therefore a = 2$ $T_1 = 1 + b + c$ $\quad T_2 = 1(2)^2 + b(2) + c$ $1 + b + c = 4$ $\quad 4 + 2b + c = 5$ $b + c = 3$ …(1) $\quad 2b + c = 1$ …(2) (2) – (1): $b = -2$ Subs. into (1): $-2 + c = 3$ $c = 5$ $\therefore T_n = n^2 - 2n + 5$		
1.3.2	1 ; 3 ; 5 ; 7 ; … $S_n = \frac{n}{2}[2a + (n-1)d]$ ✓ correct formula $S_{20} = \frac{20}{2}[2(1) + 19(2)]$ ✓ correct substitution $= 10(2 + 38)$ $= 10(40)$ ✓ simplification $= 400$ ✓ answer	(4)	**R**
QUESTION 2			
2.1	$\sum_{x=1}^{n} \frac{1}{12}(7^x) = \frac{960\,799}{12}$ $\sum_{x=1}^{n} \frac{1}{12}(7^x) = \frac{1}{12}(7^1) + \frac{1}{12}(7^2) + \frac{1}{12}(7^3) + \ldots$ $= \frac{7}{12} + \frac{7^2}{12} + \frac{7^3}{12} + \ldots$ ✓ expansion $S_n = \frac{a(r^n - 1)}{r - 1}$ ✓ formula $\frac{960\,799}{12} = \frac{\frac{7}{12}(7^n - 1)}{7 - 1}$ ✓ substitution $\frac{960\,799}{12} \times 6 = \frac{7}{12}(7^n - 1)$ $823\,542 = 7^n - 1$ $823\,543 = 7^n$ ✓ simplification $\therefore 7 = n$ ✓ conclusion	(6)	**C**
2.2	$r = 2x + 1$ Series converges if $-1 < r < 1$ ✓ definition $\therefore -1 < 2x + 1 < 1$ $-1 - 1 < 2x < 1 - 1$ $-2 < 2x < 0$ ✓ $-1 < x < 0$ ✓ simplification	(1) (2)	**K** **R**

SOLUTIONS		MARKS	COGNITIVE LEVELS
2.3	$T_1 = 108\ cm^2$ $T_2 = 80\% \times 108$ $= 86{,}4\ cm^2$ $T_3 = 69{,}12\ cm^2$ $r = 80\%$ (**OR** $\frac{T_2}{T_1} = \frac{86{,}4}{108} = \frac{4}{5}$) $= \frac{80}{100}$ $= \frac{4}{5}$ ✓ common ratio $S_\infty = \frac{a}{1-r}$ ✓ formula $= \frac{108}{1-\frac{4}{5}}$ ✓ substitution $= \frac{108}{\frac{1}{5}}$ $= 540\ cm^2$ ✓ answer	(5)	**P**
QUESTION 3 			
3.1	Inverse: $y = ax^2$ ✓ equation Subs. (2; 2): $2 = a.2^2$ $\frac{2}{4} = a$ $a = \frac{1}{2}$ ✓ value $\therefore y = \frac{1}{2}x^2$ ✓ equation	(3)	**C**
3.2	Yes, because each value of x will have only one corresponding value of y. ✓ (**OR** it will be a many-to-one function **OR** it passes the vertical line test)	(1)	**K**

SOLUTIONS		MARKS	COGNITIVE LEVELS
QUESTION 4			
4.1	$g(x) - f(x) > 0$ $g(x) > f(x)$ for $x \in (-\infty;0) \cup (1;\infty)$ OR $x < 0$ *or* $x > 1$ ✓✓ each interval	(2)	**P**
4.2	Inverse: $x = -2^y$ ✓ inverse $-x = 2^y$ $y = \log_2(-x)$, $x < 0$ $f^{-1}(x) = \log_2(-x)$, $x < 0$ ✓ log form	(2)	**C**
4.3	$f^{-1}(x) = \log_2(-x)$, $x < 0$  ✓ x-intercept ✓ shape ✓ one point	(3)	**R**
4.4	$y = x$ ✓ equation	(1)	**K**
4.5	T(1;–2) Restricted domain of f: $x \in [1;\infty)$ ✓ (interval) (OR $x \in (-\infty;1]$)	(1)	**C**
4.6	$f(x) = -2^x$ Reflection across x-axis: $y = -(-2^x)$ $= 2^x$ ✓ reflection Shifted 3 units down: $y = 2^x - 3$ ✓ translation i.e. $k(x) = 2^x - 3$	(2)	**R**
QUESTION 5			
5.1	$t = 0$ $y = 54(2{,}7183)^{0{,}12(0)}$ = 54 million ✓ answer	(1)	**R**
5.2	$671 = 54(2{,}7183)^{0{,}12t}$ ✓ correct substitution $\frac{671}{54} = 2{,}7183^{0{,}12t}$ $\therefore 0{,}12t = \log_{2{,}7183}\frac{671}{54}$ ✓ log form $0{,}12t = 2{,}5197\ldots$ $t = 21$ years ✓ answer **OR** can 'take logs' on both sides	(3)	**P**

13. 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 exemplar test provided above. 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 56% of the marks, and the two higher for 44%.

Cognitive level	Mark out of 50	Percentage of marks in the test	Percentage of marks at each level prescribed by the CAPS (p. 53)
Knowledge (K)	3	6%	≈ 20%
Routine Procedures (RP)	25	50%	≈ 35%
Complex Procedures (CP)	12	24%	≈ 30%
Problem Solving (PS)	10	20%	≈ 15%

14. A sheet of formulae for learners

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$			
$A = P(1 + ni)$	$A = P(1 - ni)$	$A = P(1 - i)^n$	$A = P(1 + i)^n$
$T_n = a + (n - 1)d$			
$S_n = \frac{n}{2}(2a + (n - 1)d)$			
$T_n = ar^{n-1}$	$S_n = \frac{a(r^n - 1)}{r - 1}$ $r \neq 1$	$S_\infty = \frac{a}{1 - r}$; $-1 < r < 1$	
$F = \frac{x[(1 + i)^n - 1]}{i}$	$P = \frac{x[1 - (1 + i)^{-n}]}{i}$		
$f'(x) = \lim_{h \to 1} \frac{f(x + h) - f(x)}{h}$			
$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$	$M(\frac{x_1 + x_2}{2}; \frac{y_1 + y_2}{2})$		
$y = mx + c$	$y - y_1 = m(x + x_1)$	$m = \frac{y_2 - y_1}{x_2 - x_1}$	$m = \tan\theta$
$(x - a)^2 + (y - b) = r^2$			
In $\triangle ABC$: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$		$a^2 = b^2 + c^2 - 2bc.\cos A$	area $\triangle ABC$: $\frac{1}{2}ab.\sin C$
$\sin(\alpha + \beta) = \sin\alpha.\cos\beta + \cos\alpha.\sin\beta$		$\sin(\alpha - \beta) = \sin\alpha.\cos\beta - \cos\alpha.\sin\beta$	
$\cos(\alpha + \beta) = \cos\alpha.\cos\beta - \sin\alpha.\sin\beta$		$\cos(\alpha - \beta) = \cos\alpha.\cos\beta + \sin\alpha.\sin\beta$	
$\cos 2\alpha = \begin{cases} \cos^2\alpha - \sin^2\alpha \\ 1 - 2\sin^2\alpha \\ 2\cos^2\alpha - 1 \end{cases}$		$\sin 2\alpha = 2\sin\alpha.\cos\alpha$	

15. Exemplar formal assessment mark record sheets

15.1 Term 1

Grade 12 Mathematics: Exemplar formal assessment mark record sheet Term 1										
	Assignment		Investigation/ Project		Test 1		Term 1			
	/...	SBA weighting /10	/....	SBA Weighting /20	/50	SBA Weighting /10	Total	Term 1 %	Rating (1–7)	
Date of assessment:										
NAME AND SURNAME										

Grade 12 Mathematics: Exemplar formal assessment mark record sheet Term 2										
	Test			Exam Paper 1	Exam Paper 1	Exam Total		Total		
	/50	/50	SBA Weighting /10	/150	/150	/300	SBA Weighting /15	Total	Term 2 %	Rating (1–7)
Date of assessment:										
NAME AND SURNAME										

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

16.1 Conventional schools[1]

NAME OF TEACHER:_____ **SUBJECT/GRADE:** _____

Week no. in planner _____

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

Refer to the planner[2] **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?[3] (Rough estimate)				
How many learners in this class?				

DAY[4]	**BRIEF NOTES ON THE DAY'S WORK: Consider such things as:** *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?*
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.
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 Estimate of learners in that grade that are working confidently at Level 4 (adequate achievement) or above.
4 This can also be lessons if there are more than five lessons a week.

16.2 Multigrade schools[1]

NAME OF TEACHER:_____

Week no. in planner _____

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

Refer to the planner[2] **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:** *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?*
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.

Jika iMfundo
what I do matters

Jik'iMfundo is a programme to improve learning outcomes, funded by the National Education Collaboration Trust, the KwaZulu-Natal Department of Education and others.

THE PROGRAMME TO IMPROVE LEARNING OUTCOMES

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ISBN: 978-1-990904-63-9