

# DBE PAST PAPERS

# **Maths Toolkit**

**OFFICIAL EXAMS & MEMOS** 

Anne Eadie, Gretel Lampe, Jenny Campbell & Susan Carletti

GRADE 12 CAPS



# Grade 12 Maths Toolkit | DBE Past Papers

# **OFFICIAL EXAMS & MEMOS**

The Answer Series Grade 12 Maths Toolkit is a low-priced product, offering both theory and practice, and is perfect for exam preparation for matrics.

This UP-TO-DATE publication is indeed a TOOLKIT, containing:

**DBE Nov Paper 1 & Paper 2 Exams** (2016 – 2023) with **comprehensive solutions** to all papers, including TOPIC GUIDES that make it possible to select questions on **separate topics**. **Challenging questions**, aligned with DBE Diagnostic Reports, have been clearly indicated throughout this study guide.

### Supportive, vital documents & powerful summaries

- mark distribution and cognitive levels
- the curriculum
- all examinable proofs
- summaries on trigonometry, quadrilaterals, concavity, analytical geometry and circle geometry,
- theorem statements and acceptable reasons
- calculator instructions
- DBE formulae / information sheet

#### How learners can improve their exam techniques:

- write a few of the papers under exam conditions
- get comfortable with having to concentrate for the full 3 hour time period
- learn to work though the paper a few times, answering all the routine questions first, then coming back for more challenging questions that take more time, and
- finally, when all else is done, tackling the questions that need more time and attention

Good exam technique makes a huge difference to anyone's ability to produce top quality work under pressure and there is no doubt that The Answer Series Grade 12 Maths Toolkit levels the playing fields and ensures that everyone has equal access to success.



# grade 122 caps

# Maths Toolkit official exams & memos

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# ► GRADE 12 MATHEMATICS 2-in-1

- 1) Questions in topics
- 2 Exam papers
- 3 A separate booklet on challenging, Level 3 & 4 questions

Full solutions provided throughout

# ► GRADE 12 MATHEMATICS P & A

10 additional, challenging practice exams & answers

# THIS PAST PAPERS TOOLKIT INCLUDES

- DBE Exam Papers
- Comprehensive solutions to all papers compiled by our authors, not from the official memoranda
- Supportive, vital documents & powerful summaries

eBook 두 available →



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Be sure to incorporate these Theory documents regularly as you revise.





DBE PI: TOPIC GUIDE	2016	2017	2018	2019	2020	2021	2022	20
> Algebra: [25]								
Quadratic equations & theory	1.1.1, 1.1.2, 1.2.1	1.1.1, 1.1.2	1.1.1, 1.1.2	1.1.1, 1.1.2	1.1.1, 1.1.2	1.1.1, 1.1.2, 1.3*	1.1.1, 1.1.2	1.1.1,
Quadratic inequalities	1.2.2	1.3.1	1.1.3	1.1.3	1.1.3	1.1.3	1.1.3	1.1
Simultaneous equations	1.3	1.2	1.2	1.2	1.2	1.2	1.2	1.
Exponents:								
Expressions			1.3*				1.3	
Equations & Inequalities	1.1.4			1.3*	1.3*		1.4*	1.3
Surds: Expressions								
Equations	1.1.3	1.1.3	1.1.4	1.1.4	1.1.4	1.1.4	1.1.4	1.1
<ul> <li>Logs (Application)</li> </ul>								
Patterns & Sequences: [25] Quadratic	3.1*	2.1		2.1	2.2	3.1, 3.2, 3.3*, 3.4*	3	2.2
Arithmetic	2.1 – 2.3, 2.4*	2.2			2.1	4.1, 4.2		2.1
Geometric	3.2*		3.1, 3.2	2.2	11.3*	2	2.1	3.1
Σ		3*	3.3, 3.4*	3.1*	3.1, 3.2*	4.3*, 4.4	2.2	3.1
Mixed / General			2.1 – 2.3	3.2				3.2
<ul> <li>Finance, Growth &amp; Decay: [15] Simple &amp; compound growth &amp; decay</li> </ul>		6.1		6.1	6.2	8.1, 8.2	6.1	6.1.1,
Nominal & Effective interest rates								6.1
Annuities	7.1 – 7.3, 7.4*	6.2*	7.2	6.2	6.1, 6.3*	8.3*	6.2, 6.3*	6.2.2,
Time line			7.1*					
<ul> <li>Functions &amp; Graphs: [35]</li> <li>Straight line and/or parabola</li> </ul>		1.3*, 4.1 – 4.4, 4.5*, 4.6, 4.7*	6.1 – 6.3, 6.4*, 6.6*			7		
Hyperbola			5.1 – 5.3,		4.1	5	4.1	
Exponent. & log function (incl. Inverses)	<b>4.</b> 1 – 4.4, 4.5*					6.1, 6.2*, 6.3, 6.4*		
Inverse functions			4.1 – 4.3, 4.4*	5.1 - 5.3, 5.4*, 5.5*	5.1, 5.2, 5.3*, 5.4*, 5.5		5.1 – 5.4, 5.5*	
Mixed	5.1, 5.2*, 5.3, 5.4*, 5.5*, 6.1, 6.2, 6.3*, 6.4	5.1 – 5.5, 5.6*		4.1 – 4.6, 4.7*	4.2		4.2	4.1 – 4.7 (
> Differential Calculus : [35]								
Finding the derivative: 1 <sup>st</sup> principles	8.1, 8.2*	7.1	8.1	7.1	7.1	9.1	7.1	7.1
Finding the derivative: using the rules	8.3	7.2	8.2	7.2, 7.3	7.2, 8.4	9.2	7.2	7.2
Finding the average gradient								
Tangent: the gradient & the equation	8.4*			7.4*				7.3
Curve sketching & f " & concavity	5.6*, 9.1, (9.2 – 9.4)*	8*	5.4*, 6.5*, 9.1*, 9.2	9.1, 9.2*, 9.3, 9.4*	8.1, 8.2, 8.3*	(10.1 – 10.4*)*	7.3*, 8.1, 8.2, 8.3*	8.1 – 8.5
Practical application (incl. max/min)	1.2.3, 10.1, 10.2*, 10.3*	9*	10*	8.1, 8.2*, 8.3	8.5*, 9.1*, 9.2*	11*	9*	9*
> Probability: [15] Probability rules			12.1			12.1*		10.
Venn diagrams		10.1, 10.2*, 10.3*		11.1*			10.1*	
Tree diagrams			12.2*		11.1*, 11.2			10.2
2-way Contingency tables	11.1, 11.2*, 11.3							
Fundamental Counting Principle	12*	11*	11*	10*, 11.2	10*	12.2*	10.2*	10.3

# DBE NOVEMBER EXAMS

# **DBE NOV 2016 PAPER 1**

Clearly show ALL calculations, diagrams, graphs, etc. that you have used in determining your answers.

Answers only will NOT necessarily be awarded full marks.

You may use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.

If necessary, round off answers to **TWO** decimal places, unless stated otherwise.

Answers on p. Al

## ALGEBRA AND EQUATIONS AND **INEQUALITIES** [24]

#### **QUESTION 1**

1.1 Solve for x: 1.1.1 x(x-7) = 0(2)1.1.2  $x^2 - 6x + 2 = 0$  (correct to TWO decimal places) (3) 1.1.3  $\sqrt{x-1} + 1 = x$ (5)1.1.4  $3^{x+3} - 3^{x+2} = 486$ (4)1.2 Given:  $f(x) = x^2 + 3x - 4$ 1.2.1 Solve for x if f(x) = 0(2)1.2.2 Solve for x if f(x) < 0(2)1.2.3 Determine the values of x for which  $f'(x) \ge 0$ (2)1.3 Solve for x and y: x = 2y and  $x^2 - 5xy = -24$  (4) [24] **PATTERNS & SEQUENCES [26] QUESTION 2** Answers on p. Al Given the finite arithmetic sequence: 5 ; 1 ; -3 ; .....; -83 ; -87 2.1 Write down the fourth term (T<sub>4</sub>) of the sequence. (1)(3) 2.2 Calculate the number of terms in the sequence. 2.3 Calculate the sum of all the negative numbers in the (3)sequence. 2.4\* Consider the sequence: 5; 1; -3; ....; -83; -87; ....; -4187 Determine the number of terms in this sequence that (4) [11] will be exactly divisible by 5.

#### **QUESTION 3**

Answers on p. A2

(4)

3.1\* The first four terms of a guadratic number pattern are -1; x; 3; x+8

3.1.1 Calculate the value(s) of x.

3.1.2 If x = 0, determine the position of the first term in the quadratic number pattern for which the sum of the first *n* first differences will be greater than 250. (4)

3.2\* Rectangles of width 1 cm are drawn from the edge of a sheet of paper that is 30 cm long such that there is a 1 cm gap between one rectangle and the next. The length of the first rectangle is 21 cm and the length of each successive rectangle is 85% of the length of the previous rectangle until there are rectangles drawn along the entire length of AD. Each rectangle is shaded.



## FUNCTIONS & GRAPHS [35]

**QUESTION 4** 

## Answers on p. A2

Sketched below is the graph of  $h(x) = a^x$ . a > 0. R is the y-intercept of h.



- 4.4 D is a point such that DQ || y-axis and DP || x-axis. Calculate the length of DP. (4)
- 4.5\* Determine the values of k for which the equation h(x + 2) + k = 0 will have a root that is less than -6. (3) [11]

Finding some challenges along the way? Use the memo wisely and make sure you process and understand every step of the solution.

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DBE NOV 2017: PAPER

#### Answers on p. A17

In the diagram, P(-4; 5) and K(0; -3) are the end points of the diameter of a circle with centre M. S and R are respectively the *x*- and y-intercepts of the tangent to the circle at P.  $\theta$  is the inclination of PK with the positive direction of the *x*-axis.





**6.2\*** Let A be a point of intersection of the graphs of **f** and **g**. Show that the *x*-coordinate of A satisfies the equation  $\sin x = \frac{-1 + \sqrt{5}}{2}$ . (4)

**6.3\*** Hence, calculate the coordinates of the points of intersection of graphs of **f** and **g** for the interval  $x \in [-270^{\circ}; 90^{\circ}]$ .

#### QUESTION 7

Answers on p. A20

AB represents a vertical netball pole. Two players are positioned on either side of the netball pole at points D and E such that D, B and E are on the same straight line. A third player is positioned at C. The points B, C, D and E are in the same horizontal plane.

The angles of elevation from C to A and from E to A are x and y respectively. The distance from B to E is k.







3.2.2 The length of the sheet is 30 cm  

$$\therefore$$
 15 rectangles can be drawn  
The sum of the **areas** of the 15 rectangles:  
 $S_{15}$   
 $= 21 \times 1 + 21 \times 0.85 \times 1 + 21 \times (0.85)^2 \times 1 + \dots \dots 15$  terms  
 $= \frac{21 \left[1 - (0.85)^{15}\right]}{1 - 0.85} \qquad S_n = \frac{a(1 - r^n)}{1 - r}$   
 $= 127,77 \text{ cm}^2$   
 $\therefore$  The % that is shaded  $= \frac{127,77}{21 \times 30} = 0.20281...$   
 $\simeq 20,28\% \checkmark$   
FUNCTIONS AND GRAPHS [35]  
4.1  $y = 0 \checkmark \dots$  The asymptote is the x-axis!  
 $\&$  The eqn. of the x-axis is  $y = 0$   
4.2  $R(0; 1) \checkmark \dots$  At R,  $x = 0$   $\& y = a^0 = 1$   
4.3 Pt P(2; 9) on graph  $y = a^x$   
Substitute:  $\therefore 9 = a^2$   
 $\therefore a = 3 \checkmark \dots a \ge 0$  in  $y = a^x$   
4.4 Pt Q(b;  $\frac{1}{81}$ ) on graph  $y = 3^x \qquad \dots a = 3$  in 4.3  
 $\therefore \frac{1}{81} = 3^b$   
 $\therefore 3^b = 3^{-4} \qquad \dots \frac{1}{81} = \frac{1}{3^4} = 3^{-4}$   
 $\therefore b = -4$   
 $\therefore x_D = -4$   
 $\therefore x_D = -4$   
 $\therefore Length of DP = 4 + 2 \qquad \dots or, 2 - (-4)$   
 $= 6$  units  $\checkmark$ 

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