

# ACKNOWLEDGEMENTS & PUBLICATIONS

*The Answer* proudly offers this new *Answer Series* publication in Grade 12 MATHS. The Papers (5× Paper 1's, 5× Paper 2's and 5× Paper 3's) were set by IEB examiners, Marilyn Buchanan, John Luis and Ryno Reichert all of whom have a unique flair for setting challenging, interesting and innovative questions. The latest IEB exams (Paper 1, 2 & 3) plus solutions have been included.

## YOUR PARTICIPATION!

We rely on suggestions, comments, criticism . . . as we embark on providing the best revision material possible for the new FET curriculum.

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### Gr 11 - 12:

- MATHEMATICS
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- ECONOMICS
- ENGLISH 1<sup>ST</sup> ADDITIONAL LANGUAGE
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- & Gr 10:**
- MATHEMATICS
  - MATHEMATICAL LITERACY
  - PHYSICAL SCIENCES
  - LIFE SCIENCES.
  - ACCOUNTING

On a personal note, our sincere thanks go to . . . . .

- ☐ Olivia Rumble for her many cheerful creations which adorn this book.
- ☐ The DTP team who have worked creatively and tirelessly on this presentation.
- ☐ The printing squad for their dedication and willingness to meet deadlines!



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*The Answer*  
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**THE ANSWER SERIES** study-aids are fundamental to the success of any matriculant. Designed to enrich the understanding of learners, they provide essential exam technique and experience. Learners can work independently, thereby enabling educators to cope with large classes. All **ANSWER SERIES** study-aids are of the highest standard and are constantly adapted to meet the needs of both learners and educators countrywide. **(ESTABLISHED 1975)**

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## A NOTE FROM THE AUTHORS

The advent of the new National Senior Certificate is both exciting and challenging. At last we have a school mathematics syllabus we can be proud of. The challenge is for all, particularly the educators, to embrace the new and make mathematics a meaningful, accessible and dare I say pleasurable experience! For too long mathematics has been viewed by the majority as a collection of mysterious rules understood by only a few individuals. Now is the time for the mathematics classroom to be a space where mathematics makes sense!

There is a lot of truth in the old saying "you get what you test". How the new NSC is assessed has huge impact on what happens in our schools. An obvious challenge for all is the lack of practice material for the new matriculation examination. This modest publication is an attempt to address this issue. Marilyn Buchanan, John Luis and Ryno Reichert are experienced mathematics examiners for the IEB and as such are well qualified to author this book.

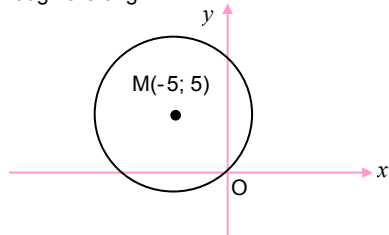
An external examination is not a suitable vehicle for teaching content. To expect a learner to be responsive to some new hypothesis is very unrealistic. A book such as this, however, does allow the authors a chance to expose both learners and educators to something different. Hence although the team of authors have tried their very best to produce exemplars which are of the right standard there are one or two questions which are more challenging in nature.

Finally as the moderator of the material I hope that you will find this book a very useful indicator of what to expect in your final examination. Good luck in your future mathematical endeavours.

The authors will welcome constructive comments on the examination papers and their structuring.

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1.2 In the diagram below, the circle has centre M(-5; 5) and passes through the origin.

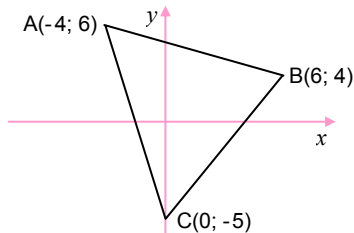


- 1.2.1 Determine the equation of the tangent to the circle at the origin. (4)
- 1.2.2 Determine the radius of the circle leaving answers in surd form. (2)
- 1.2.3 Write down the equation of the circle. (2)
- 1.2.4 Determine the points of intersection of the straight line  $y = x + 10$  with the circle. (4)

**21 marks**

**QUESTION 2**

2.1 In the diagram,  $\triangle ABC$  is sketched. A(-4; 6), B(6; 4) and C(0; -5).



- 2.1.1.1 Transform  $\triangle ABC$  using the rule  $(x; y) \rightarrow (y; -x)$ . Give the co-ordinates of the vertices of the image  $\triangle A'B'C'$  obtained. (3)
- 2.1.1.2 Describe the transformation in 2.1.1.1. (1)
- 2.1.2.1 Transform  $\triangle ABC$  using the rule  $(x; y) \rightarrow (-x; -y)$ . Give the co-ordinates of the vertices of the image  $\triangle A'B'C'$  obtained. (3)
- 2.1.2.2 Describe the transformation in 2.1.2.1. (1)

**8 marks**

**QUESTION 3**

3.1 If  $\tan \theta = 2$  and  $\theta$  and  $\beta$  are complementary angles, i.e.  $\theta + \beta = 90^\circ$  find using a sketch and without a calculator the value of  $\cos \theta \cdot \cos \beta$ .  
Answers must be left in surd form. (5)

3.2 Calculate the value of each of the following correct to four decimal digits.

3.2.1  $3 \sin 343,6^\circ + \tan \frac{28,2^\circ}{12}$  (1)

3.2.2  $\frac{\sqrt{\sin 18^\circ}}{(\cos 18^\circ)^3}$  (1)

3.3 Craig asked his uncle Hedley to check the following calculation:

$$\begin{aligned} & \sin(A - 30^\circ) \\ &= \sin A - \sin 30^\circ \quad \dots \text{line 1} \\ &= \sin A - \frac{1}{\sqrt{3}} \quad \dots \text{line 2} \end{aligned}$$

Hedley claims that there is an error in line 1 as well as in line 2.

3.3.1 Explain the error in line 1. (1)

3.3.2 Explain the error in line 2. (1)

3.4.1 Simplify without using a calculator:  $\frac{\sin(A - 45^\circ)}{\cos(A + 45^\circ)}$ . (6)

3.4.2 Hence, without any further working out write down the value of  $\frac{\sin(-35^\circ)}{\cos 55^\circ}$ . (1)

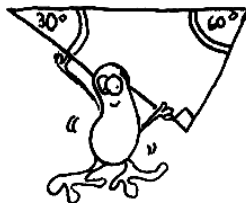
3.5.1 Prove that  $\frac{1}{1 - \sin \theta} - \frac{1}{1 + \sin \theta} = \frac{2 \tan \theta}{\cos \theta}$ . (4)

3.5.2 Hence, if it is given that  $\sin 22^\circ = p$ , express  $\frac{2 \tan 158^\circ}{\cos(-22^\circ)}$  in terms of  $p$ . (3)

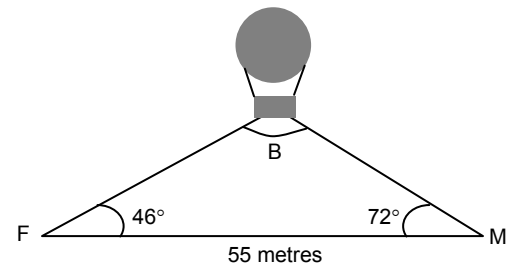
3.6 Solve for  $\theta \in [0^\circ; 360^\circ]$  correct to one decimal digit if  $\cos(\theta - 21^\circ) = 1 - \sqrt{2}$ . (3)

3.7 Given the equation:  $\tan(\theta - 12^\circ) = -\tan 35^\circ$   
3.7.1 Without using a calculator, write down the general solution. (3)

3.7.2 Hence, or otherwise, write down the values of  $\theta \in [-150^\circ; 75^\circ]$  which satisfy the equation. (2)



3.8



Two people are walking toward each other on a path through the park. The path runs east and west. A hot air balloon is directly above the path between them. One of the walkers, a female, sees the balloon when looking east at an angle of elevation of  $46^\circ$ . The other walker, a male, sees the balloon looking west at an angle of elevation of  $72^\circ$ . If the walkers are 55 metres apart, how far is the balloon from the male observer? (4)

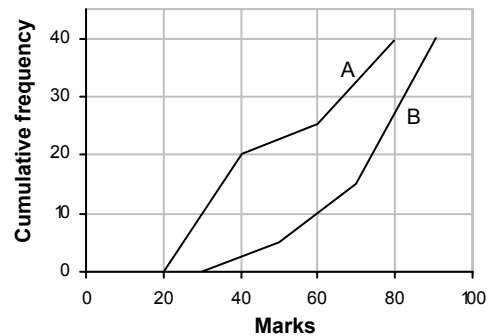
3.9 The lengths of the sides of a triangle are 10 cm, 19 cm and 23 cm.  
3.9.1 Determine the size of the largest angle. (4)

3.9.2 The area of the triangle. (3)

**42 marks**

**QUESTION 4**

4.1 The ogives given below show the marks of Class A and Class B in a Mathematics test.



4.1.1 Complete the following table and present the marks distribution of both classes by drawing the box and whisker diagrams.

	Lower Quartile	Median	Upper Quartile
Class A			
Class B			

