

Grade 12 – Book B

(First edition – CAPS)

CONTENTS:

	<u>Page:</u>
B1. Differential calculus	3
B2. Probability	141

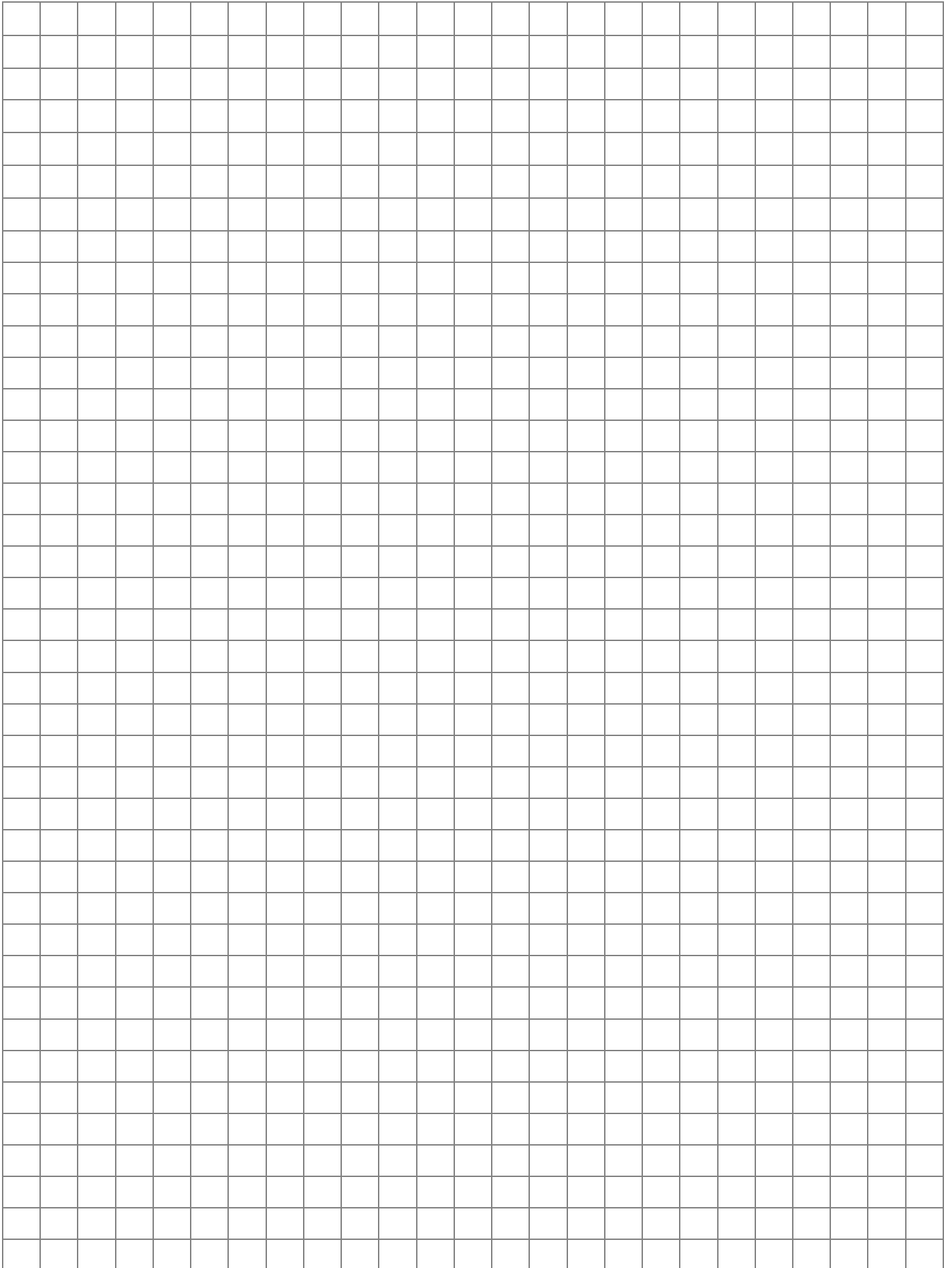
This book was compiled and processed by E.J. Du Toit in 2023.

Copyright © 2023. All copyrights reserved. No part of this publication may be reproduced in any form, unless written consent was obtained.

WITH SPECIAL THANKS AND ACKNOWLEDGMENT TO THE DEPARTMENT OF EDUCATION FOR THE USE OF EXTRACTS FROM OLD PAPERS.

ISBN 978-1-928336-64-8

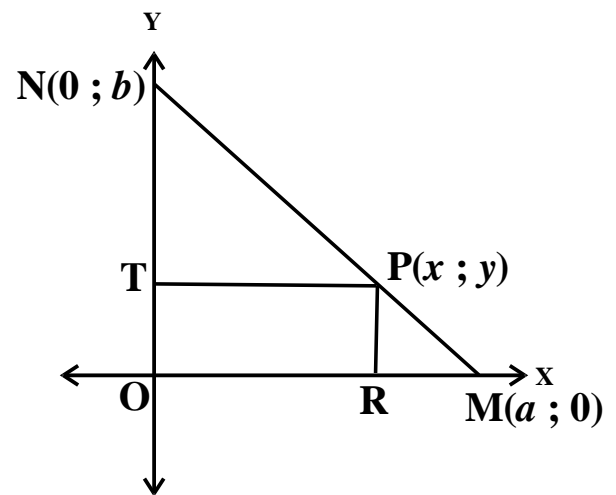
Also visit www.abcmathsandscience.co.za for extra exercise, tests and exam papers.



- (c) Determine the turning points of g . (6)

- (d) Sketch the graph of g . (4)

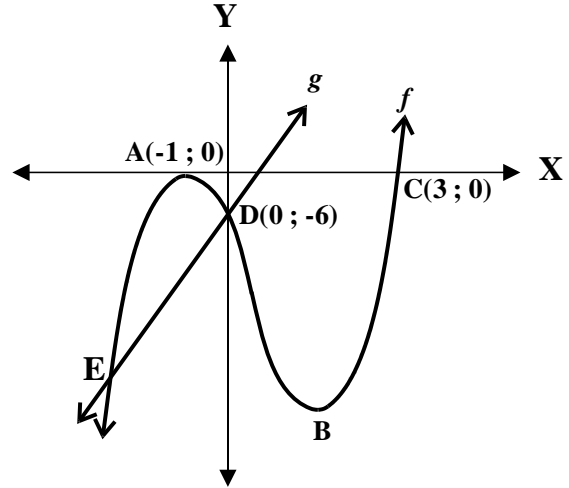
- (3) A farmer has a piece of land in the shape of a right-angled triangle OMN , as shown in the figure below. He allocates a rectangular piece of land $PTOR$ to his daughter, giving her the freedom to choose P anywhere along the boundary MN . Let $OM = a$, $ON = b$ and $P(x; y)$ be any point on MN .



- (a) Determine an equation of MN in terms of a and b . (2)

(ii) $\frac{dy}{dx}$ if $y = \frac{8 - 3x^6}{8x^5}$ (4)

- (2) The graphs of $g(x) = 6x - 6$ and $f(x) = ax^3 + bx^2 + cx + d$ are sketched alongside. $A(-1; 0)$ and $C(3; 0)$ are the x -intercepts of f . The graph of f has turning points at A and B. $D(0; -6)$ is the y -intercept of f . E and D are the points of intersection of the graphs of f and g .



- (a) Show that $a = 2$; $b = -2$; $c = -10$ and $d = -6$. (5)

- (b) Calculate the coordinates of the turning point B. (5)

- (b) Calculate the x -coordinate of the point at which $f'(x)$ is a maximum. (3)

- (3) Consider the graph of $g(x) = -2x^2 - 9x + 5$.

- (a) Determine the equation of the tangent to the graph of g at $x = -1$. (4)

- (b) For which values of q will the line $y = -5x + q$ not intersect the parabola? (3)

- (4) Given: $h(x) = 4x^3 + 5x$

- Explain whether it is possible to draw a tangent to the graph of h that has a negative gradient. Show ALL your calculations. (3)

- (5) A particle moves along a straight line. The distance, s (in metres) of the particle from a fixed point on the line at time t seconds ($t \geq 0$) is given by
 $s(t) = 2t^2 - 18t + 45$.

(a) Calculate the particle's initial velocity. (Velocity is the rate of change of distance.) (3)

(b) Determine the rate at which the velocity of the particle is changing at t seconds. (1)

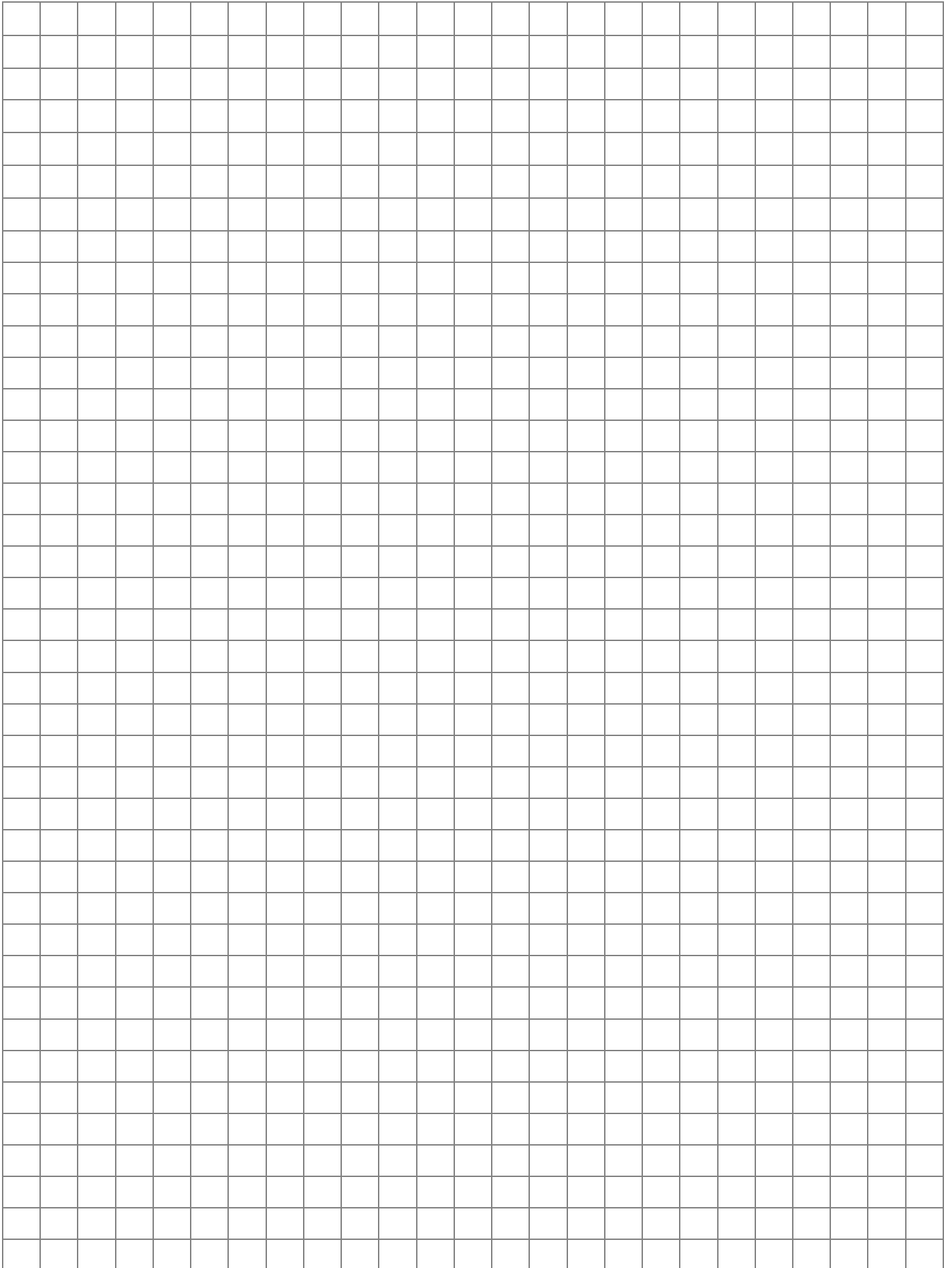
(c) After how many seconds will the particle be closest to the fixed point? (2)

Exercise D:

Date: _____

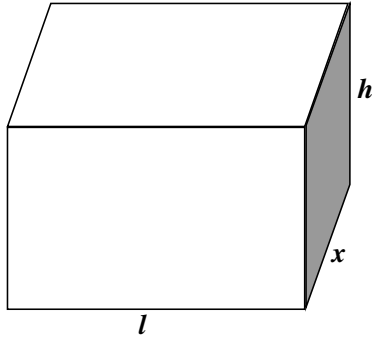
- (1) (a) Use the definition of the derivative (first principles) to determine $f'(x)$ (5)
 if $f(x) = 2x^2$.

- (b) Determine $\frac{dy}{dx}$ if $y = \frac{2\sqrt{x} + 1}{x^2}$ (4)



- (d) Sketch the graph of f . Show all intercepts with the axes and all turning points. (3)

- (3) A rectangular box is constructed in such a way that the length (l) of the base is three times as long as its width. The material used to construct the top and the bottom of the box costs R100 per square metre. The material used to construct the sides of the box costs R50 per square metre. The box must have a volume of 9 m^3 . Let the width of the box be x metres.



- (a) Determine an expression for the height (h) of the box in terms of x . (3)

- (b) Show that the cost to construct the box can be expressed as $K = \frac{1200}{x} + 600x^2$. (3)
