

DBE NOV 2026 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.*

Diagrams are NOT necessarily drawn to scale.

ALGEBRA, EQUATIONS & INEQUALITIES [24]



QUESTION 1

1.1 Solve for x:

1.1.1 $x^2 + x - 6 = 0$ (3)

1.1.2 $2x + 10 = 3x^2$ *(correct to TWO decimal places)* (4)

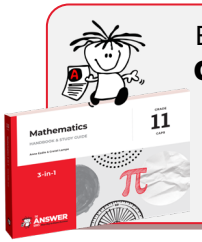
1.1.3 $81.2^{x-4} - 3^x = 0$ (3)

1.1.4 $\sqrt{x+6}.\sqrt{10-x} = 4\sqrt{3}$ (4)

1.2 Solve simultaneously for x and y if:

$y - 2x - 2 = 0$ and $y^2 + 3x^2 - 4 = 0$ (5)

1.3 The product of two numbers is less than 15.
The second number is 2 more than the first number.
Calculate ALL the possible values of the first number. (5)
[24]



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PATTERNS & SEQUENCES [23]



QUESTION 2

2.1 Consider the arithmetic sequence:

$$-1;\ -\frac{2}{3};\ -\frac{1}{3};\ \ldots;\ 27$$

2.1.1 Write down the constant difference of the sequence. (1)

2.1.2 How many terms are there in this sequence? (2)

2.1.3 Without calculating the answer, express the sum of the last 65 terms of this sequence in sigma notation. (3)

2.2 The n^{th} term of a geometric series is given by $T_n = (4)^{-n+5}$

2.2.1 Write down the first TWO terms of this series. (2)

2.2.2 Which term of the series is equal to $\frac{1}{1\,024}$?
Show ALL your working. (3)

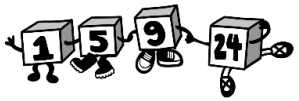
2.2.3 Determine S_∞ of this series. (3)
[14]

QUESTION 3

3.1 The constant second difference of a quadratic number pattern is -2. The pattern has a maximum value of 44 at the 8^{th} term. Determine the general term of this quadratic pattern in the form $T_n = an^2 + bn + c$. (4)

3.2 There was a hole at the bottom of a rusty water tank. The hole became bigger as water passed through it. A certain amount of water passed through the hole at the end of the first minute. At the end of each minute thereafter, 2 more litres of water passed through the hole than at the end of the previous minute.

If the tank was half full at the end of 36 minutes and empty at the end of 54 minutes, how many litres of water passed through the hole at the end of the first minute? (5)
[9]



FUNCTIONS & GRAPHS [36]

QUESTION 4

Given the function $f(x) = 5^{-x}$

4.1 Explain why f is a decreasing function. (1)

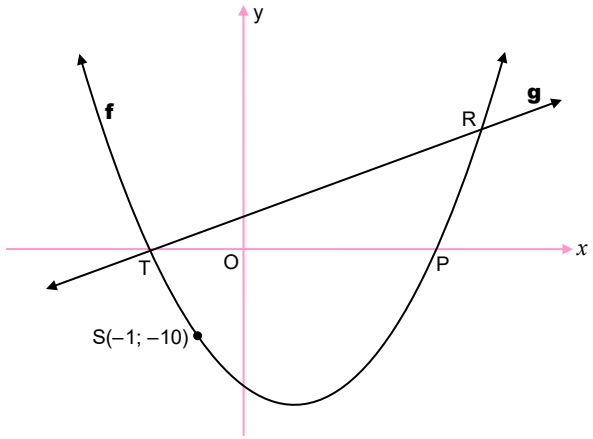
4.2 Determine $f^{-1}(x)$, the inverse of $f(x)$, in the form y = . . . (2)

4.3 Draw the graphs of f and f^{-1} on the same set of axes. Clearly show the asymptotes and intercept(s) with the axes for EACH graph. (4)

4.4 Write down the values of x for which $f^{-1}(x) \geq -1$ (2)
[9]

QUESTION 5

In the graph below, S(–1; –10) lies on the graph of $f(x) = ax^2 + bx + c$. T and P are the x-intercepts of f and TP = 6 units. The graph of $g(x) = 2x + 4$ intersects f at T and R.



5.1 Write down the coordinates of T. (1)

5.2 Show that a = 2; b = –4 and c = –16. (4)

5.3 Use the graph to determine the values of x for which:

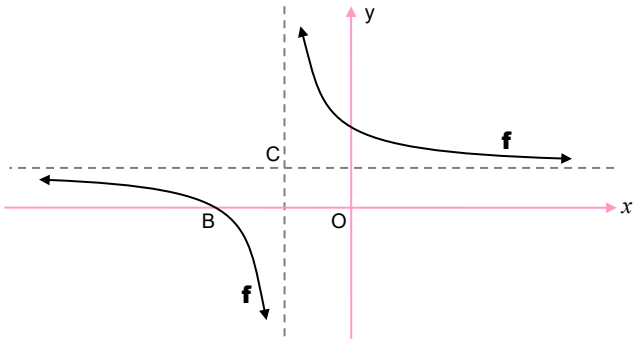
5.3.1 $f(x) + 18 > 0$ (3)

5.3.2 $g(x).g^{-1}(x) = 0$, where $g^{-1}(x)$ is the inverse of $g(x)$ (3)
[11]

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QUESTION 6

The graph of $f(x) = \frac{4}{x+2} + 3$ is drawn below. C is the point of intersection of the asymptotes of f and B is the x-intercept of f.



6.1 Write down the equation of the vertical asymptote of f. (1)

6.2 Write down the range of f. (1)

6.3 Calculate the coordinates of B. (3)

6.4 Determine the values of k for which $y = -4x + k$ is a tangent to f. (6)

6.5 Calculate the distance between B and D, where D is the reflection of B in the line of symmetry of f, having a negative gradient. (5)

[16]



FINANCE, GROWTH & DECAY [14]

QUESTION 7



7.1 Mr Martins bought a car for R465 000. The car depreciates annually at a rate of 11,5% p.a. according to the reducing-balance method. After how many years will the book value of the car be R197 700? (3)

7.2 Thadi invests R10 000 into an account earning interest of 6,5% p.a., compounded half-yearly. After 3 years, the interest rate increased to 7% p.a., compounded quarterly. How much will Thadi's investment be worth at the end of 5 years? (4)

7.3 Daniella started working on 1 January 1980. At the end of January 1980 and at the end of each month thereafter, she deposited R800 into an annuity fund. She continued doing this until she retired on 31 December 2023.

7.3.1 The interest rate for this fund was 7,5% p.a., compounded monthly. Calculate the value of the fund at the time she retired. (4)

7.3.2 On 31 December 2023, Daniella invested the full amount of her annuity fund into a savings account that pays interest at 6% p.a., compounded monthly. On 31 January 2024, she made her first withdrawal of a fixed amount from this account for her living expenses. She will continue to withdraw this same amount at the end of each month thereafter for a period of 20 years. Calculate the maximum amount of her monthly withdrawals. (3)

[14]

DIFFERENTIAL CALCULUS [36]

QUESTION 8

8.1 Determine $f'(x)$ from first principles if it is given that $f(x) = -x^2 + x$ (5)

8.2 Determine:

8.2.1 $g'(x)$ if $g(x) = 3\sqrt[3]{x} - 3x^2$ (3)

8.2.2 $\frac{dy}{dx}$ if $y = \frac{4x^3 - x}{2x - 1}$ and $x \neq \frac{1}{2}$ (3)

[11]

QUESTION 9

9.1 Given $f(x) = -x^3 + 6x^2 - 9x + 4$

9.1.1 Show that $(x - 1)$ is a factor of $f(x)$. (1)

9.1.2 Calculate the coordinates of the x-intercepts of f. (3)

9.1.3 Calculate the values of k for which $f(x) = k$ will have three distinct real roots. (5)

9.1.4 The graph of f is concave down for $x > 2$. Determine the values of x for which $g(x) = f(-x) + 2$ will be concave up. (2)

9.2 The equation of the tangent to $f(x) = 3x^3 + ax^2 + bx + c$ at $x = 2$, is given by $y = 3$. The rate at which the gradient of f is changing at $x = 2$, is 0. Calculate the values of a, b and c. (6)

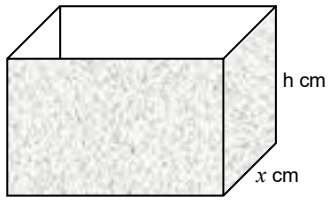
[17]

QUESTION 10

A rectangular box, which is open at the top, has the following dimensions:

- Breadth of x cm
- Length is twice the breadth
- Height of h cm
- Total surface area of 300 cm^2





10.1 Express h in terms of x. (2)

10.2 Show that the volume of the box is given by $V = 100x - \frac{2}{3}x^3$ (2)

10.3 Calculate the maximum volume of the box. (4)

[8]

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PROBABILITY [17]

QUESTION 11

11.1 The following information is known about events A and B:

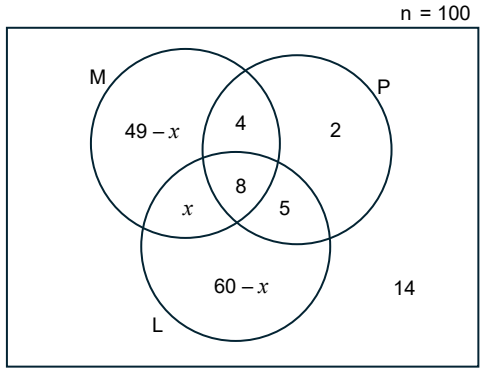
- P(only A) = 0,16
- P(A and B) = 0,3
- P(not (A or B)) = 0,28



11.1.1 Are events A and B mutually exclusive? Justify your answer. (2)

11.1.2 Determine P(B). (3)

11.2 A survey was conducted among 100 learners to establish how many of them took Mathematics (M), Physical Sciences (P) and Life Sciences (L). The results are shown in the Venn-diagram below, where x represents the number of learners who took Mathematics and Life Sciences but not Physical Sciences.



11.2.1 Show that $x = 42$. (1)

11.2.2 Is taking Mathematics independent of taking Life Sciences? Justify your answer by showing ALL your working. (5)

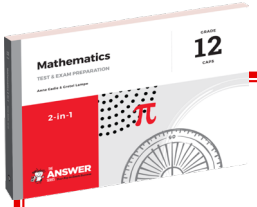
11.3 The tuckshop at a school sells 3 different flavours of cold drinks, 2 different flavours of energy drinks and 4 different flavours of fruit juices. A worker at the tuckshop chose ONE bottle of EACH flavour of the 3 different types of drinks available, to display in a row on a shelf.

11.3.1 In how many different ways can the bottles of drinks be arranged on the shelf if they can be arranged in any order? (1)

11.3.2 The juice is in glass bottles. While the worker was arranging the chosen bottles on the shelf, a few bottles of juice fell and broke. The worker continued to arrange the remaining bottles of drinks. The probability of arranging the bottles of drinks such that an energy drink is at the beginning and at the end of the row is now $\frac{1}{21}$. How many bottles of juice broke? Show ALL your calculations. (5)

[17]

TOTAL: 150

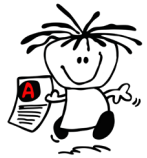


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