

FUNCTIONS AND GRAPHS

Every question, eight papers

DBE · National Senior Certificate · Mathematics Paper 1

November 2021 - 2024 and May/June 2021, 2022, 2024, 2025

22 questions · 277 marks · 8 papers

Each question is a clip of the original DBE page. The wording, the mark allocations and the diagrams are exactly as they were printed - nothing has been retyped or redrawn. Only the blank answer space has been removed, so work in a separate book.

How it is arranged

One chapter per topic, so you can work through a whole skill at a time.

Inside a chapter the questions run from fewest marks to most. That is an order by size, not by difficulty: unlike the IEB, the DBE does not split its papers into an easier and a harder section, and its marking guidelines carry no cognitive-level tags. Nothing in these papers ranks one question as harder than another, so this booklet does not pretend otherwise.

Contents

Exponential and logarithmic graphs, and inverses	8 questions, 81 marks
8 to 14 marks each	
The hyperbola	7 questions, 87 marks
10 to 20 marks each	
The parabola, and the line that crosses it	7 questions, 109 marks
9 to 18 marks each	

Exponential and logarithmic graphs, and inverses

Graphs that grow or decay, the logarithms that undo them, and what reflecting in the line $y = x$ does to a domain and a range. These are the shortest questions in the book - eight to fourteen marks - and the marks are for knowing what an inverse IS rather than for calculation.

8 questions · 81 marks

8 to 14 marks each

1. The inverse of 3 to the x, and where a translated point lands

DBE NSC Paper 1 · May/June 2021 · Q6 · 8 marks

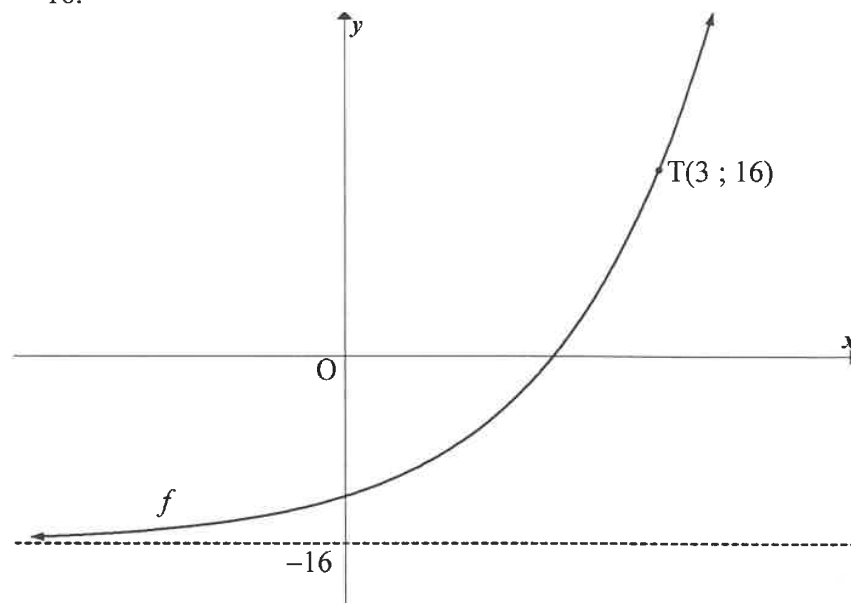
QUESTION 6

6.1 Given: $g(x) = 3^x$

6.1.1 Write down the equation of g^{-1} in the form $y = \dots$ (2)

6.1.2 Point $P(6 ; 11)$ lies on $h(x) = 3^{x-4} + 2$. The graph of h is translated to form g . Write down the coordinates of the image of P on g . (2)

6.2 Sketched is the graph of $f(x) = 2^{x+p} + q$. $T(3 ; 16)$ is a point on f and the asymptote of f is $y = -16$.



Determine the values of p and q .

(4)
[8]

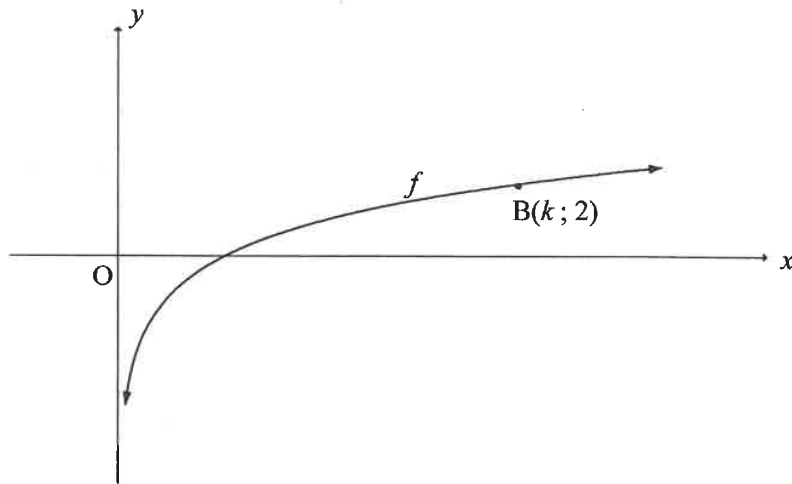
2. Log base 4: find k, then write down the inverse

DBE NSC Paper 1 · November 2021 · Q6 · 8 marks

QUESTION 6

The graph of $f(x) = \log_4 x$ is drawn below.

$B(k; 2)$ is a point on f .



- 6.1 Calculate the value of k . (2)
- 6.2 Determine the values of x for which $-1 \leq f(x) \leq 2$. (2)
- 6.3 Write down the equation of f^{-1} , the inverse of f , in the form $y = \dots$ (2)
- 6.4 For which values of x will $x \cdot f^{-1}(x) < 0$? (2)
- [8]**

3. Find a , then describe the translation from g to h

DBE NSC Paper 1 · May/June 2022 · Q4 · 9 marks

QUESTION 4

The graph of $g(x) = a\left(\frac{1}{3}\right)^x + 7$ passes through point $E(-2; 10)$.

4.1 Calculate the value of a . (3)

4.2 Calculate the coordinates of the y -intercept of g . (2)

4.3 Consider: $h(x) = \left(\frac{1}{3}\right)^x$

4.3.1 Describe the translation from g to h . (2)

4.3.2 Determine the equation of the inverse of h , in the form $y = \dots$ (2)

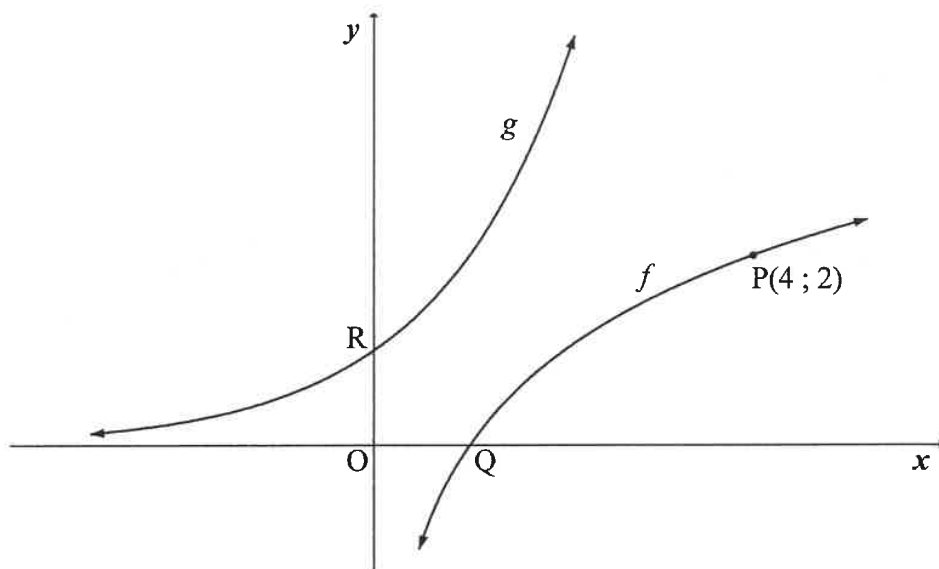
[9]

4. A logarithm and its reflection in the line $y = x$

DBE NSC Paper 1 · May/June 2024 · Q5 · 9 marks

QUESTION 5

In the diagram, the graphs of $f(x) = \log_a x$ and g are drawn. Graph g is the reflection of f in the line $y = x$. Graph f passes through the point $P(4; 2)$. Q is the x -intercept of f and R is the y -intercept of g .



5.1 Write down the coordinates of P' , the image of P on g . (2)

5.2 Show that $a = 2$. (2)

- 5.3 Write down the equation of g in the form $y = \dots$ (1)
- 5.4 T is a point on f in the first quadrant where TR is parallel to the x -axis. Calculate the area of $\triangle RTP'$. (4)
- [9]

5. An exponential shifted down one, and the range that gives it

DBE NSC Paper 1 · November 2024 · Q4 · 9 marks

QUESTION 4

Given: $f(x) = a^x - 1$ for $a > 0$. B $\left(2; \frac{-5}{9}\right)$ is a point on f .

- 4.1 Calculate the value of a . (2)
- 4.2 Write down the range of f . (1)
- 4.3 Sketch the graph of f . Clearly show the intercepts with the axes and asymptotes, if any. (3)
- 4.4 It is further given that C is a point on f at $y = \frac{19}{8}$.

Determine the coordinates of C' , the image of C, when C is reflected about the line $y = x$. (3)

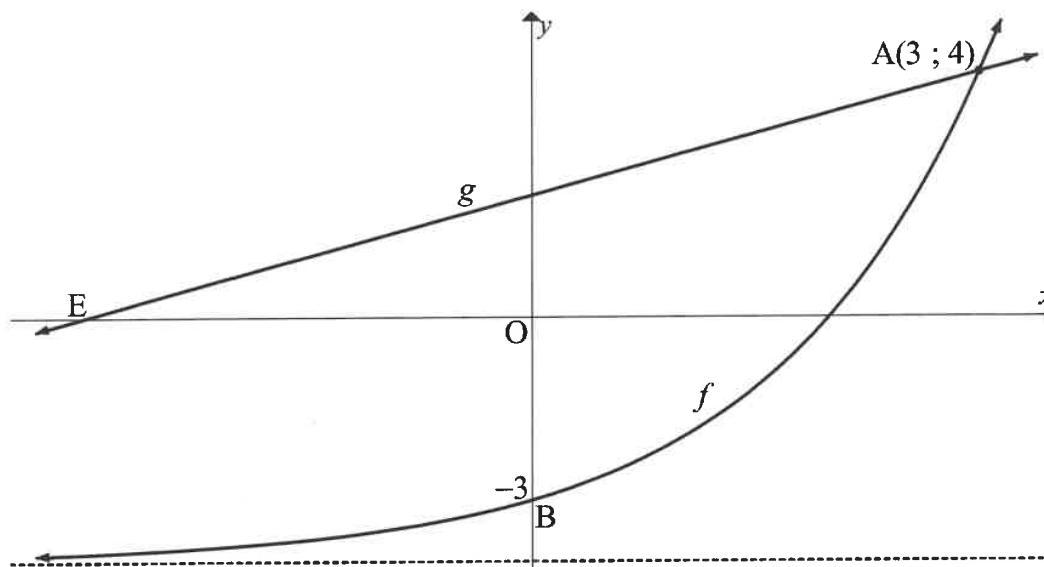
[9]

6. An exponential and a straight line meeting at (3 ; 4)

DBE NSC Paper 1 · May/June 2025 · Q6 · 11 marks

QUESTION 6

The graphs of $f(x) = p^x + q$ and $g(x) = mx + c$ are drawn below. $A(3 ; 4)$ is the point of intersection of f and g . $B(0 ; -3)$ is the y -intercept of f . E is the x -intercept of g .



- 6.1 Calculate the values of p and q . (4)
- 6.2 Write down the range of f . (1)
- 6.3 The graph of g^{-1} , the inverse of g , also passes through B . Determine the equation of g in the form $y = \dots$ (4)
- 6.4 Write down the equation of g^{-1} in the form $y = \dots$ (2)
- [11]

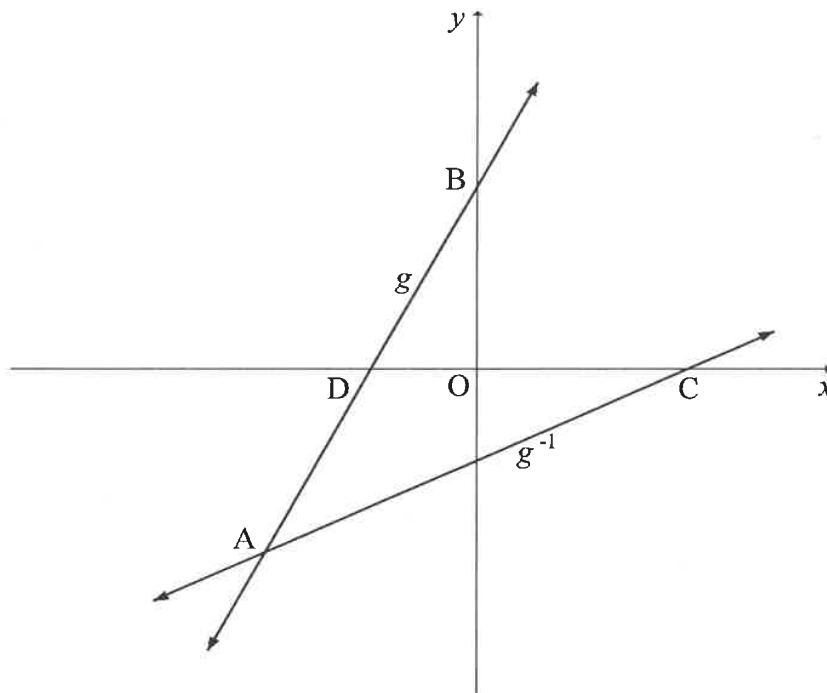
7. A straight line and its inverse, and where the two cross

DBE NSC Paper 1 · November 2022 · Q5 · 13 marks

QUESTION 5

The graphs of $g(x) = 2x + 6$ and g^{-1} , the inverse of g , are shown in the diagram below.

- D and B are the x - and y -intercepts respectively of g .
- C is the x -intercept of g^{-1} .
- The graphs of g and g^{-1} intersect at A.



- 5.1 Write down the y -coordinate of B. (1)
- 5.2 Determine the equation of g^{-1} in the form $g^{-1}(x) = mx + n$. (2)
- 5.3 Determine the coordinates of A. (3)
- 5.4 Calculate the length of AB. (2)
- 5.5 Calculate the area of $\triangle ABC$. (5)
- [13]**

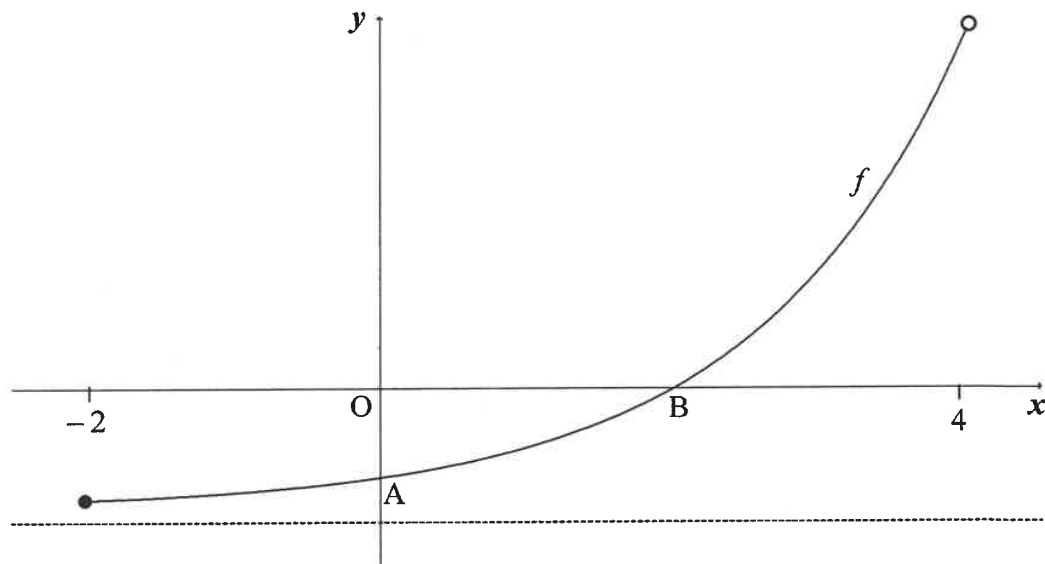
8. 2 to the x minus 4, on a closed interval

DBE NSC Paper 1 · November 2023 · Q4 · 14 marks

QUESTION 4

Sketched below is the graph of $f(x) = 2^x - 4$ for $x \in [-2; 4)$.

A and B are respectively the y - and x -intercepts of f .



- 4.1 Write down the equation of the asymptote of f . (1)
- 4.2 Determine the coordinates of B. (2)
- 4.3 Determine the equation of k , a straight line passing through A and B in the form $k(x) = \dots$ (3)
- 4.4 Calculate the vertical distance between k and f at $x = 1$ (3)
- 4.5 Write down the equation of g if it is given that $g(x) = f(x) + 4$ (1)
- 4.6 Write down the domain of g^{-1} . (2)
- 4.7 Write down the equation of g^{-1} in the form $y = \dots$ (2)

[14]

The hyperbola

Two branches, two asymptotes, and an equation of the form $a/(x + p) + q$.
Almost every question here is the same journey in one direction or the other: from the equation to the asymptotes and the sketch, or from a couple of given facts back to p , q and a .

7 questions · 87 marks

10 to 20 marks each

9. Show that $p = 4$ and $q = -3$, then sketch the hyperbola

DBE NSC Paper 1 · May/June 2021 · Q4 · 10 marks

QUESTION 4

The lines $y = x + 1$ and $y = -x - 7$ are the axes of symmetry of the function $f(x) = \frac{-2}{x+p} + q$.

- 4.1 Show that $p = 4$ and $q = -3$. (4)
- 4.2 Calculate the x -intercept of f . (2)
- 4.3 Sketch the graph of f . Clearly label ALL intercepts with the axes and the asymptotes. (4)
- [10]**

10. Asymptotes, domain, and both intercepts

DBE NSC Paper 1 · November 2021 · Q5 · 10 marks

QUESTION 5

Given: $f(x) = \frac{-1}{x-3} + 2$

- 5.1 Write down the equations of the asymptotes of f . (2)
- 5.2 Write down the domain of f . (1)
- 5.3 Determine the coordinates of the x -intercept of f . (2)
- 5.4 Write down the coordinates of the y -intercept of f . (2)
- 5.5 Draw the graph of f . Clearly show ALL the asymptotes and intercepts with the axes. (3)
- [10]**

11. Asymptotes, a sketch, and where the graph is positive

DBE NSC Paper 1 · May/June 2024 · Q4 · 10 marks

QUESTION 4

Given: $g(x) = \frac{1}{x-1} + 2$

- 4.1 Write down the equations of the asymptotes of g . (2)
- 4.2 Draw a graph of g , indicating any intercepts with the axes and asymptotes. (4)
- 4.3 Determine the values of x where $g(x) > 0$. (2)
- 4.4 Determine the equation of the axis of symmetry of g which has a negative gradient. (2)
- [10]

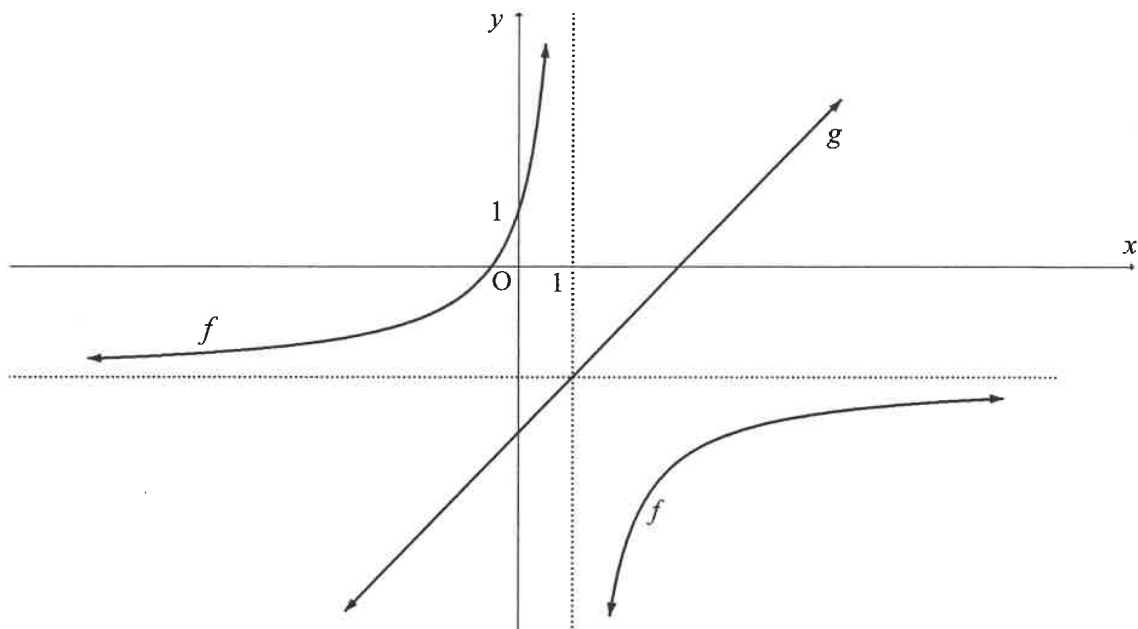
12. A line of symmetry is given - find p and q from it

DBE NSC Paper 1 · November 2024 · Q5 · 10 marks

QUESTION 5

Sketched below is the graph of $f(x) = \frac{a}{x+p} + q$ having the domain $(-\infty; 1) \cup (1; \infty)$.

The graph of f cuts the y -axis at $(0; 1)$. A line of symmetry of f is given by $g(x) = x - 3$.



- 5.1 Write down the value of p . (1)
- 5.2 Determine the equation of the horizontal asymptote of f . (2)
- 5.3 Calculate the value of a . (2)

5.4 For which values of x is $f(x) \geq 0$? (3)

5.5 Graph f undergoes a transformation to h where:

- The domain and range of h are the same as that of f
- $h'(x)$, the derivative of h , is negative on its domain

Describe a possible transformation that f could have undergone to result in h . (2)
[10]

13. Build the equation back from its domain and one intercept

DBE NSC Paper 1 · May/June 2022 · Q5 · 12 marks

QUESTION 5

Consider: $g(x) = \frac{a}{x+p} + q$

The following information of g is given:

- Domain: $x \in \mathbb{R}; x \neq -2$
- x -intercept at $K(1; 0)$
- y -intercept at $N\left(0; -\frac{1}{2}\right)$

5.1 Show that the equation of g is given by: $g(x) = \frac{-3}{x+2} + 1$ (6)

5.2 Write down the range of g . (1)

5.3 Determine the equation of h , the axis of symmetry of g , in the form $y = mx + c$, where $m > 0$. (3)

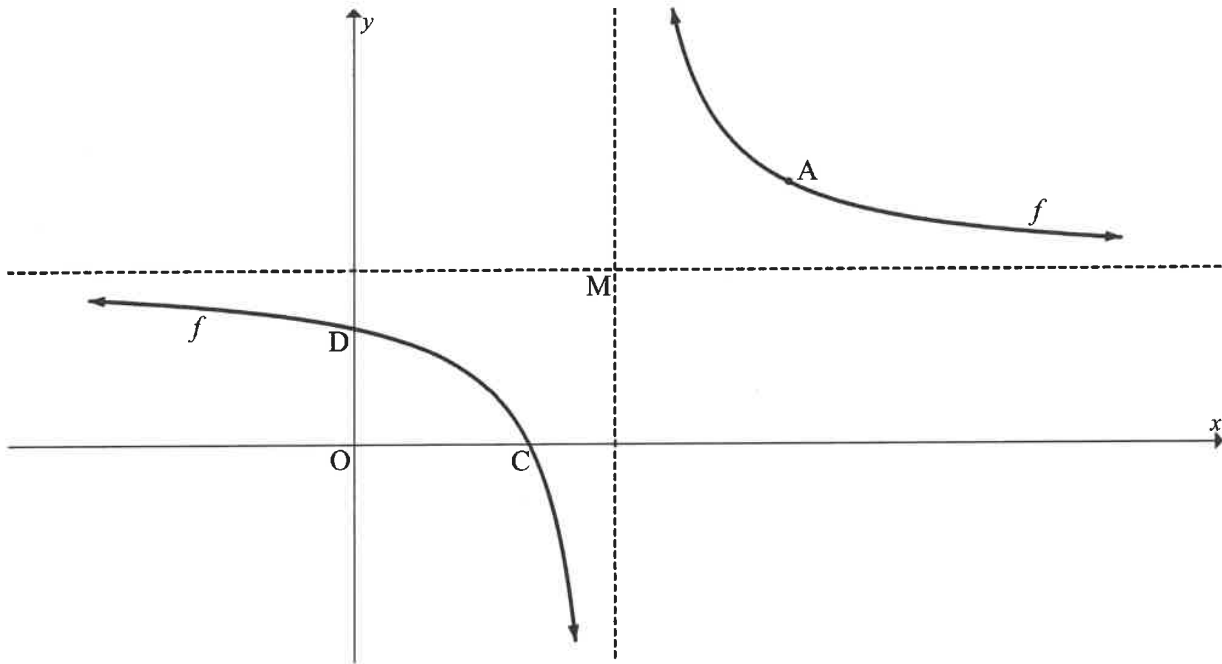
5.4 Write down the coordinates of K' , the image of K reflected over h . (2)
[12]

14. Where the asymptotes meet, and the point on f closest to it

DBE NSC Paper 1 · May/June 2025 · Q4 · 15 marks

QUESTION 4

The graph of $f(x) = \frac{4}{x-3} + 4$ is drawn below. M is the point where the asymptotes of f intersect. C and D are the x - and y -intercepts respectively of f . A is the point on f that is closest to M .



- 4.1 Write down the coordinates of M . (2)
- 4.2 Calculate the coordinates of D . (2)
- 4.3 If $y = x + t$ is the equation of a line of symmetry of f , calculate the value of t . (2)
- 4.4 Determine the values of x for which $f(x) \leq 0$. (4)
- 4.5 Calculate the coordinates of A . (3)
- 4.6 A single transformation is applied to f to obtain a new graph defined as $h(x) = \frac{-4}{x+3} + 4$. A' is the image of A under this transformation. Calculate the length of AA' . (2)

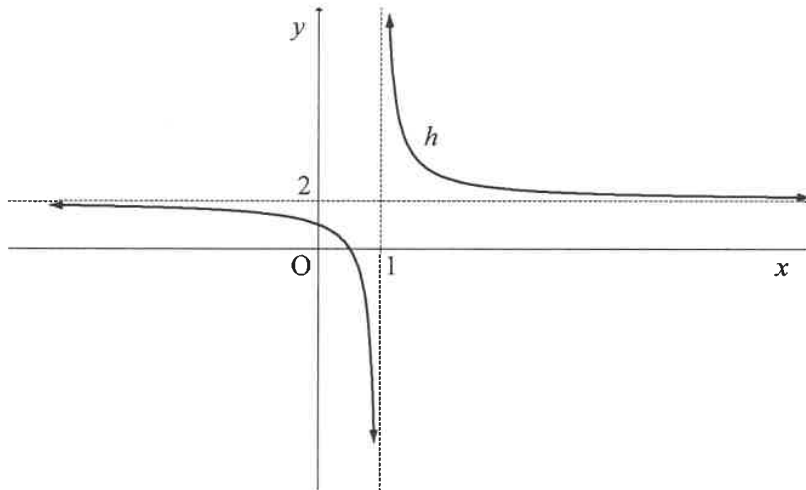
[15]

15. Asymptotes at (1 ; 2), and everything that follows from them

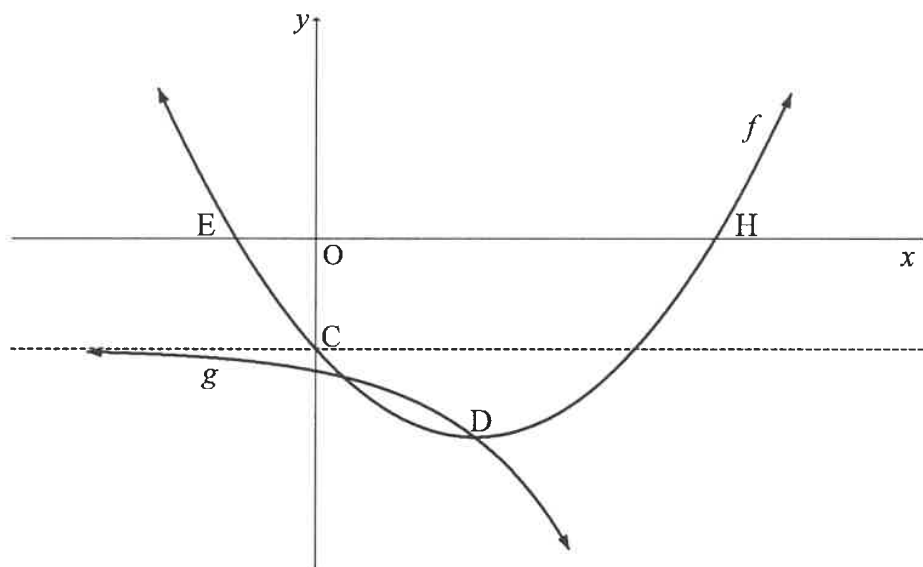
DBE NSC Paper 1 · November 2022 · Q4 · 20 marks

QUESTION 4

- 4.1 Sketched below is the graph of $h(x) = \frac{1}{x+p} + q$. The asymptotes of h intersect at (1 ; 2).



- 4.1.1 Write down the values of p and q . (2)
- 4.1.2 Calculate the coordinates of the x -intercept of h . (2)
- 4.1.3 Write down the x -coordinate of the x -intercept of g if $g(x) = h(x+3)$. (2)
- 4.1.4 The equation of an axis of symmetry of h is $y = x + t$. Determine the value of t . (2)
- 4.1.5 Determine the values of x for which $-2 \leq \frac{1}{x-1}$. (3)
- 4.2 The graphs of $f(x) = x^2 - 4x - 5$ and $g(x) = a \cdot 2^x + q$ are sketched below.
- E and H are the x -intercepts of f .
 - C is the y -intercept of f and lies on the asymptote of g .
 - The two graphs intersect at D, the turning point of f .



- 4.2.1 Write down the y -coordinate of C. (1)
- 4.2.2 Determine the coordinates of D. (2)
- 4.2.3 Determine the values of a and q . (3)
- 4.2.4 Write down the range of g . (1)
- 4.2.5 Determine the values of k for which the value of $f(x) - k$ will always be positive. (2)

[20]

The parabola, and the line that crosses it

Turning point, intercepts, and the shape between them - and nearly always a straight line drawn across it. That pairing is where the marks are: where the two graphs meet, how far apart they are vertically, and for which x one is above the other.

7 questions · 109 marks

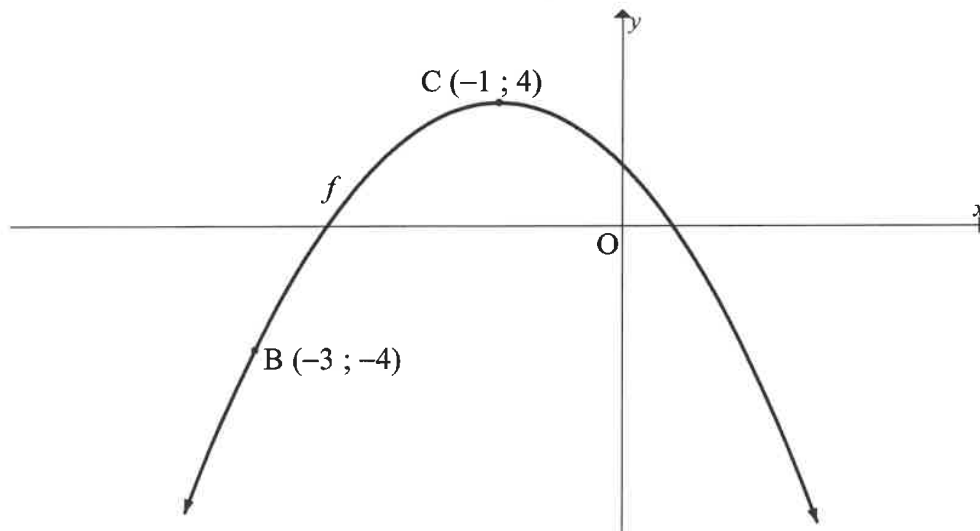
9 to 18 marks each

16. From a turning point and one other point to the equation

DBE NSC Paper 1 · May/June 2025 · Q5 · 9 marks

QUESTION 5

The graph of $f(x) = a(x + p)^2 + q$ is drawn below. $C(-1 ; 4)$ is the turning point of f . $B(-3 ; -4)$ is a point on f .



- 5.1 Show that $f(x) = -2x^2 - 4x + 2$. (3)
- 5.2 Determine the values of k for which $h(x) = f(x) + k$ will have no real roots. (2)
- 5.3 The graph of $y = g'(x)$, where g' is the derivative of g , is obtained when f is reflected over the line $y = 4$. Draw a sketch graph of g if $g(0) < 0$. Clearly indicate any stationary points on your graph. (4)
- [9]

17. The turning point, then a vertical distance on the parabola

DBE NSC Paper 1 · May/June 2022 · Q6 · 14 marks

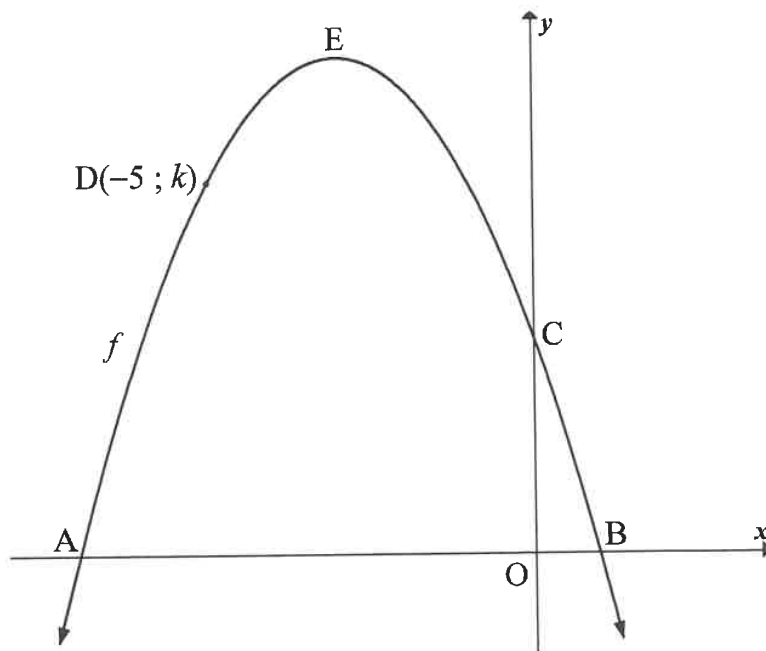
QUESTION 6

The sketch below shows the graph of $f(x) = -x^2 - 6x + 7$.

C is the y -intercept of f .

A and B are the x -intercepts of f .

$D(-5; k)$ is a point on f .



- 6.1 Calculate the coordinates of E, the turning point of f . (3)
- 6.2 Write down the value of k . (1)
- 6.3 Determine the equation of the straight line passing through C and D. (4)
- 6.4 A tangent, parallel to CD, touches f at P. Determine the coordinates of P. (4)
- 6.5 For which values of x will $f(x) - 12 > 0$? (2)

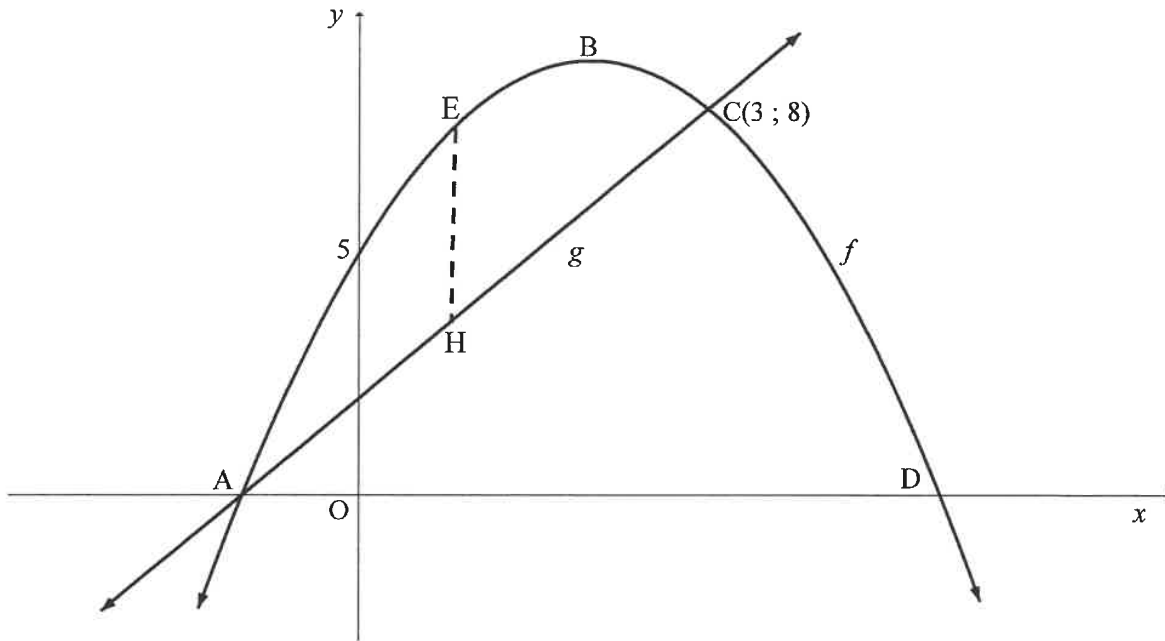
[14]

18. A parabola and a line, and the gap EH between them

DBE NSC Paper 1 · November 2024 · Q6 · 15 marks

QUESTION 6

In the diagram below, the graphs of $f(x) = -x^2 + 4x + 5$ and g , a straight line, are drawn. $C(3; 8)$ is a point of intersection of f and g . EH is drawn parallel to the y -axis, with E a point on f and H a point on g .



- 6.1 Calculate the coordinates of B, the turning point of f . (3)
- 6.2 Show that the equation of the line through A and C is given by $g(x) = 2x + 2$. (3)
- 6.3 Calculate the maximum length of EH for $f > g$. (4)
- 6.4 Given: $k(x) = f(x + m) = -x^2 - 2mx - m^2 + 4x + 4m + 5$
Determine the value of m such that g is a tangent to k . (5)

[15]

19. A parabola, and a line whose angle of inclination is given

DBE NSC Paper 1 · November 2021 · Q7 · 17 marks

QUESTION 7

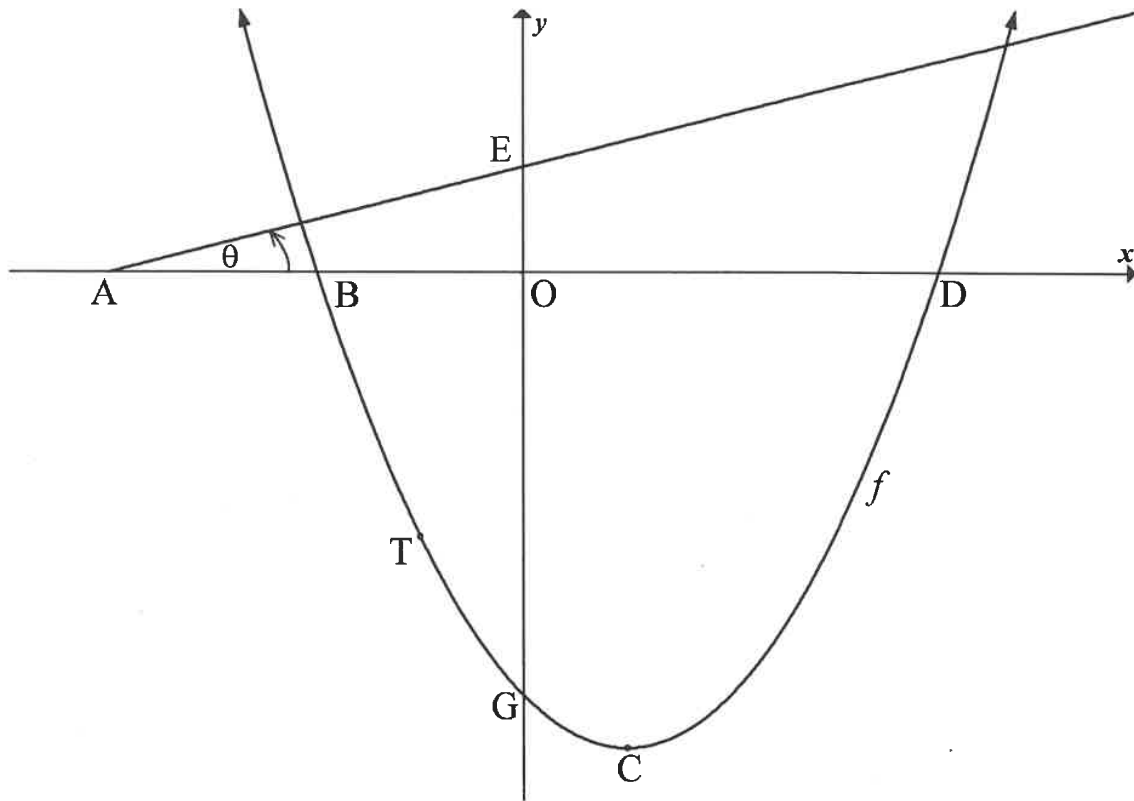
The graph of $f(x) = (x + 4)(x - 6)$ is drawn below.

The parabola cuts the x -axis at B and D and the y -axis at G.

C is the turning point of f .

Line AE has an angle of inclination of θ and cuts the x -axis and y -axis at A and E respectively.

T is a point on f between B and G.



- 7.1 Write down the coordinates of B and D. (2)
- 7.2 Calculate the coordinates of C. (2)
- 7.3 Write down the range of f . (1)
- 7.4 Given that $\theta = 14,04^\circ$ and the tangent to f at T is perpendicular to AE.
- 7.4.1 Calculate the gradient of AE, correct to TWO decimal places. (1)
- 7.4.2 Calculate the coordinates of T. (5)
- 7.5 A straight line, g , parallel to AE, cuts f at $K(-3 ; -9)$ and R. Calculate the x -coordinate of R. (6)

[17]

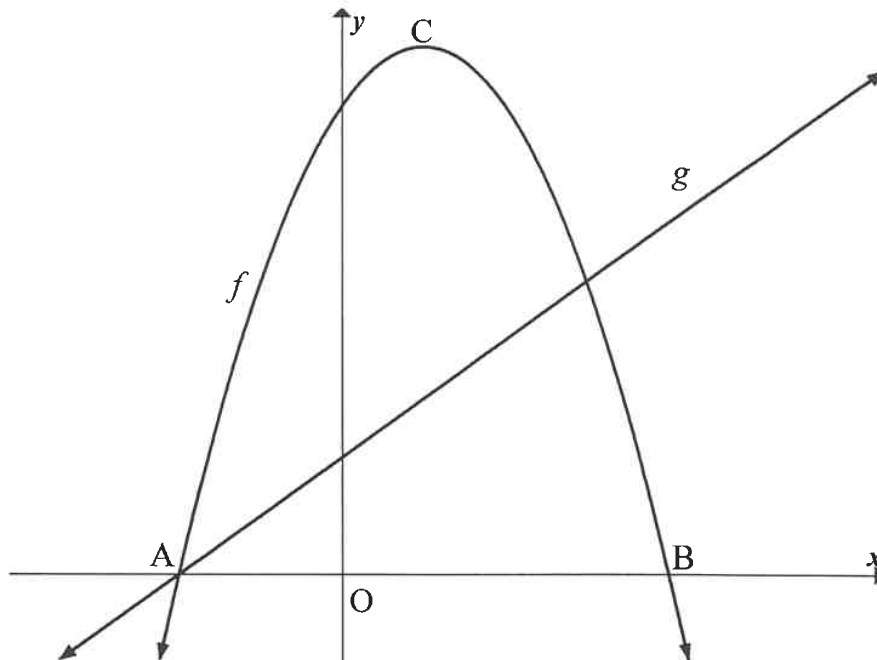
20. A parabola meeting a straight line, and the distance between them

DBE NSC Paper 1 · May/June 2021 · Q5 · 18 marks

QUESTION 5

Sketched below are the graphs of $f(x) = -2x^2 + 4x + 16$ and $g(x) = 2x + 4$.

A and B are the x -intercepts of f . C is the turning point of f .



- 5.1 Calculate the coordinates of A and B. (3)
- 5.2 Determine the coordinates of C, the turning point of f . (2)
- 5.3 Write down the range of f . (1)
- 5.4 The graph of $h(x) = f(x + p) + q$ has a maximum value of 15 at $x = 2$. Determine the values of p and q . (3)
- 5.5 Determine the equation of g^{-1} , the inverse of g , in the form $y = \dots$ (2)
- 5.6 For which value(s) of x will $g^{-1}(x) \cdot g(x) = 0$? (2)
- 5.7 If $p(x) = f(x) + k$, determine the value(s) of k for which p and g will NOT intersect. (5)

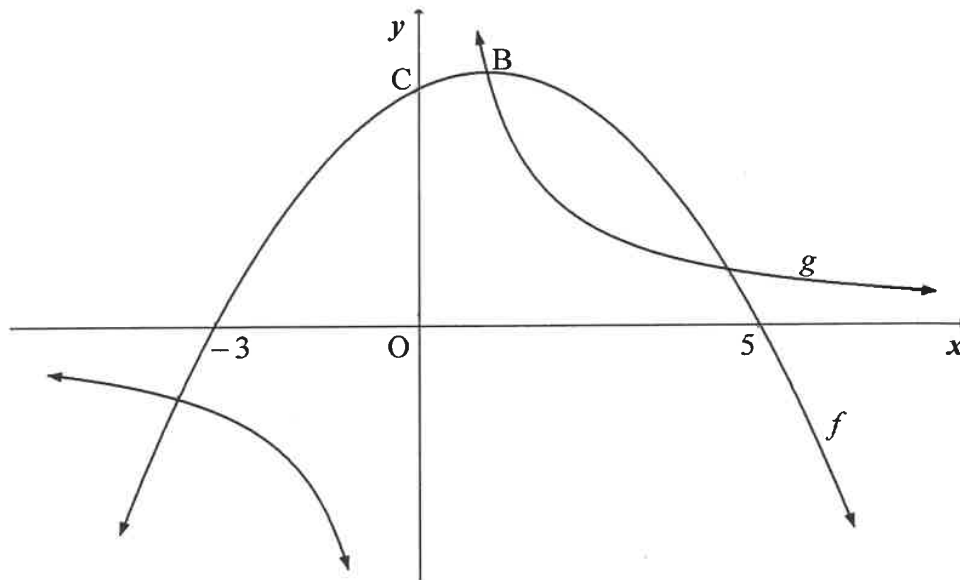
[18]

21. A turning point that is also a point of intersection

DBE NSC Paper 1 · November 2023 · Q5 · 18 marks

QUESTION 5

The graphs of $f(x) = -\frac{1}{2}(x-1)^2 + 8$ and $g(x) = \frac{d}{x}$ are drawn below. A point of intersection of f and g is B, the turning point of f . The graph f has x -intercepts at $(-3; 0)$ and $(5; 0)$ and a y -intercept at C.



- 5.1 Write down the coordinates of the turning point of f . (2)
- 5.2 Calculate the coordinates of C. (2)
- 5.3 Calculate the value of d . (1)
- 5.4 Write down the range of g . (1)
- 5.5 For which values of x will $f(x) \cdot g(x) \leq 0$? (3)
- 5.6 Calculate the values of k so that $h(x) = -2x + k$ will not intersect the graph of g . (5)
- 5.7 h is a tangent to g at R, a point in the first quadrant. Calculate t such that $y = f(x) + t$ intersects g at R. (4)

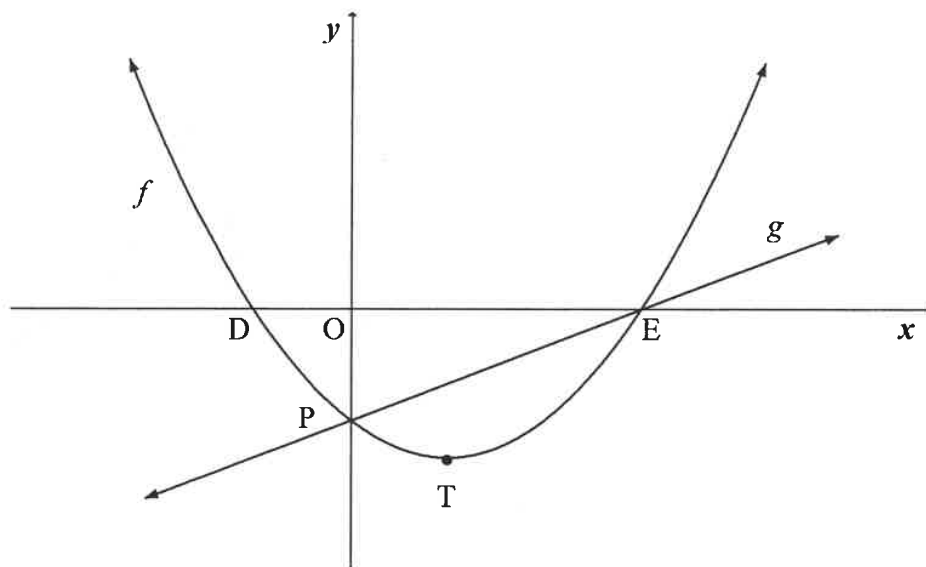
[18]

22. Range, both intersections, and the line drawn through them

DBE NSC Paper 1 · May/June 2024 · Q6 · 18 marks

QUESTION 6

The graphs of $f(x) = x^2 - 2x - 3$ and $g(x) = mx + c$ are drawn below. D and E are the x -intercepts and P is the y -intercept of f . The turning point of f is $T(1; -4)$. The graphs of f and g intersect at P and E.



- 6.1 Write down the range of f . (1)
- 6.2 Calculate the coordinates of D and E. (3)
- 6.3 Determine the equation of g . (2)
- 6.4 Write down the values of x for which $f(x) - g(x) > 0$. (2)
- 6.5 Determine the maximum vertical distance between h and g if $h(x) = -f(x)$ for $x \in [-2; 3]$. (5)
- 6.6 Given: $k(x) = g(x) - n$.
Determine n if k is a tangent to f . (5)
- [18]**

Index by paper

Every functions and graphs question in each paper, and where it sits in this booklet.

May/June 2021		3 questions, 36 of 150 marks
Q4	Show that $p = 4$ and $q = -3$, then sketch the hyperbola	10 marks p11
Q5	A parabola meeting a straight line, and the distance between them	18 marks p22
Q6	The inverse of 3 to the x, and where a translated point lands	8 marks p3
November 2021		3 questions, 35 of 150 marks
Q5	Asymptotes, domain, and both intercepts	10 marks p11
Q6	Log base 4: find k, then write down the inverse	8 marks p4
Q7	A parabola, and a line whose angle of inclination is given	17 marks p21
May/June 2022		3 questions, 35 of 150 marks
Q4	Find a, then describe the translation from g to h	9 marks p5
Q5	Build the equation back from its domain and one intercept	12 marks p13
Q6	The turning point, then a vertical distance on the parabola	14 marks p19
November 2022		2 questions, 33 of 150 marks
Q4	Asymptotes at $(1 ; 2)$, and everything that follows from them	20 marks p15
Q5	A straight line and its inverse, and where the two cross	13 marks p8
November 2023		2 questions, 32 of 150 marks
Q4	2 to the x minus 4, on a closed interval	14 marks p9
Q5	A turning point that is also a point of intersection	18 marks p23
May/June 2024		3 questions, 37 of 150 marks
Q4	Asymptotes, a sketch, and where the graph is positive	10 marks p12
Q5	A logarithm and its reflection in the line $y = x$	9 marks p5
Q6	Range, both intersections, and the line drawn through them	18 marks p24
November 2024		3 questions, 34 of 150 marks
Q4	An exponential shifted down one, and the range that gives it	9 marks p6
Q5	A line of symmetry is given - find p and q from it	10 marks p12
Q6	A parabola and a line, and the gap EH between them	15 marks p20
May/June 2025		3 questions, 35 of 150 marks
Q4	Where the asymptotes meet, and the point on f closest to it	15 marks p14
Q5	From a turning point and one other point to the equation	9 marks p18
Q6	An exponential and a straight line meeting at $(3 ; 4)$	11 marks p7

Index by topic

A question appears under every topic it uses, so it can be found even when it is filed in another chapter.

The hyperbola

7 questions

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|-----|---|-----|
| 9. | Show that $p = 4$ and $q = -3$, then sketch the hyperbola | p11 |
| 10. | Asymptotes, domain, and both intercepts | p11 |
| 11. | Asymptotes, a sketch, and where the graph is positive | p12 |
| 12. | A line of symmetry is given - find p and q from it | p12 |
| 13. | Build the equation back from its domain and one intercept | p13 |
| 14. | Where the asymptotes meet, and the point on f closest to it | p14 |
| 15. | Asymptotes at $(1 ; 2)$, and everything that follows from them | p15 |

The parabola

7 questions

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|-----|---|-----|
| 16. | From a turning point and one other point to the equation | p18 |
| 17. | The turning point, then a vertical distance on the parabola | p19 |
| 18. | A parabola and a line, and the gap EH between them | p20 |
| 19. | A parabola, and a line whose angle of inclination is given | p21 |
| 20. | A parabola meeting a straight line, and the distance between them | p22 |
| 21. | A turning point that is also a point of intersection | p23 |
| 22. | Range, both intersections, and the line drawn through them | p24 |

Exponential graphs

5 questions

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|----|--|----|
| 1. | The inverse of 3 to the x , and where a translated point lands | p3 |
| 3. | Find a , then describe the translation from g to h | p5 |
| 5. | An exponential shifted down one, and the range that gives it | p6 |
| 6. | An exponential and a straight line meeting at $(3 ; 4)$ | p7 |
| 8. | 2 to the x minus 4, on a closed interval | p9 |

Logarithmic graphs

2 questions

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| 2. | Log base 4: find k , then write down the inverse | p4 |
| 4. | A logarithm and its reflection in the line $y = x$ | p5 |

Inverses, and reflection in $y = x$

4 questions

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|----|--|----|
| 1. | The inverse of 3 to the x , and where a translated point lands | p3 |
| 2. | Log base 4: find k , then write down the inverse | p4 |
| 4. | A logarithm and its reflection in the line $y = x$ | p5 |
| 7. | A straight line and its inverse, and where the two cross | p8 |

Asymptotes

9 questions

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|-----|---|-----|
| 5. | An exponential shifted down one, and the range that gives it | p6 |
| 8. | 2 to the x minus 4, on a closed interval | p9 |
| 9. | Show that $p = 4$ and $q = -3$, then sketch the hyperbola | p11 |
| 10. | Asymptotes, domain, and both intercepts | p11 |
| 11. | Asymptotes, a sketch, and where the graph is positive | p12 |
| 12. | A line of symmetry is given - find p and q from it | p12 |
| 13. | Build the equation back from its domain and one intercept | p13 |
| 14. | Where the asymptotes meet, and the point on f closest to it | p14 |
| 15. | Asymptotes at $(1 ; 2)$, and everything that follows from them | p15 |

Domain and range

5 questions

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| 5. | An exponential shifted down one, and the range that gives it | p6 |
| 8. | 2 to the x minus 4, on a closed interval | p9 |
| 10. | Asymptotes, domain, and both intercepts | p11 |
| 13. | Build the equation back from its domain and one intercept | p13 |
| 22. | Range, both intersections, and the line drawn through them | p24 |

Intercepts with the axes

9 questions

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|-----|--|-----|
| 3. | Find a, then describe the translation from g to h | p5 |
| 4. | A logarithm and its reflection in the line $y = x$ | p5 |
| 6. | An exponential and a straight line meeting at (3 ; 4) | p7 |
| 7. | A straight line and its inverse, and where the two cross | p8 |
| 9. | Show that $p = 4$ and $q = -3$, then sketch the hyperbola | p11 |
| 10. | Asymptotes, domain, and both intercepts | p11 |
| 15. | Asymptotes at (1 ; 2), and everything that follows from them | p15 |
| 17. | The turning point, then a vertical distance on the parabola | p19 |
| 19. | A parabola, and a line whose angle of inclination is given | p21 |

The turning point

4 questions

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|-----|---|-----|
| 16. | From a turning point and one other point to the equation | p18 |
| 17. | The turning point, then a vertical distance on the parabola | p19 |
| 20. | A parabola meeting a straight line, and the distance between them | p22 |
| 21. | A turning point that is also a point of intersection | p23 |

Translations and reflections

5 questions

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|-----|---|-----|
| 1. | The inverse of 3 to the x, and where a translated point lands | p3 |
| 3. | Find a, then describe the translation from g to h | p5 |
| 12. | A line of symmetry is given - find p and q from it | p12 |
| 14. | Where the asymptotes meet, and the point on f closest to it | p14 |
| 16. | From a turning point and one other point to the equation | p18 |

Where two graphs meet

7 questions

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|-----|---|-----|
| 6. | An exponential and a straight line meeting at (3 ; 4) | p7 |
| 7. | A straight line and its inverse, and where the two cross | p8 |
| 18. | A parabola and a line, and the gap EH between them | p20 |
| 19. | A parabola, and a line whose angle of inclination is given | p21 |
| 20. | A parabola meeting a straight line, and the distance between them | p22 |
| 21. | A turning point that is also a point of intersection | p23 |
| 22. | Range, both intersections, and the line drawn through them | p24 |

Reading an inequality off the graph

4 questions

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|-----|--|-----|
| 2. | Log base 4: find k, then write down the inverse | p4 |
| 11. | Asymptotes, a sketch, and where the graph is positive | p12 |
| 15. | Asymptotes at (1 ; 2), and everything that follows from them | p15 |
| 18. | A parabola and a line, and the gap EH between them | p20 |

Where these came from

So that "every functions and graphs question" is a claim you can check.

Eight DBE NSC Mathematics Paper 1 papers were read end to end:
November 2021, 2022, 2023, 2024 and May/June 2021, 2022, 2024, 2025.

All 338 questions in them were classified. These papers are scans - they carry no text layer at all - so the structure was rebuilt by reading them with OCR, and then checked three ways: every paper adds back up to exactly 150, the Afrikaans paper matches the English question for question, and the official marking guideline, which IS ordinary text, agrees with the marks read off every question.

DBE publishes an official marking guideline for every one of these papers. The companion file "CAPS_P1_Functions_Solutions.pdf" carries the guideline for each question here, in the same order and under the same numbers.