

IEB Functions and graphs practice — Questions

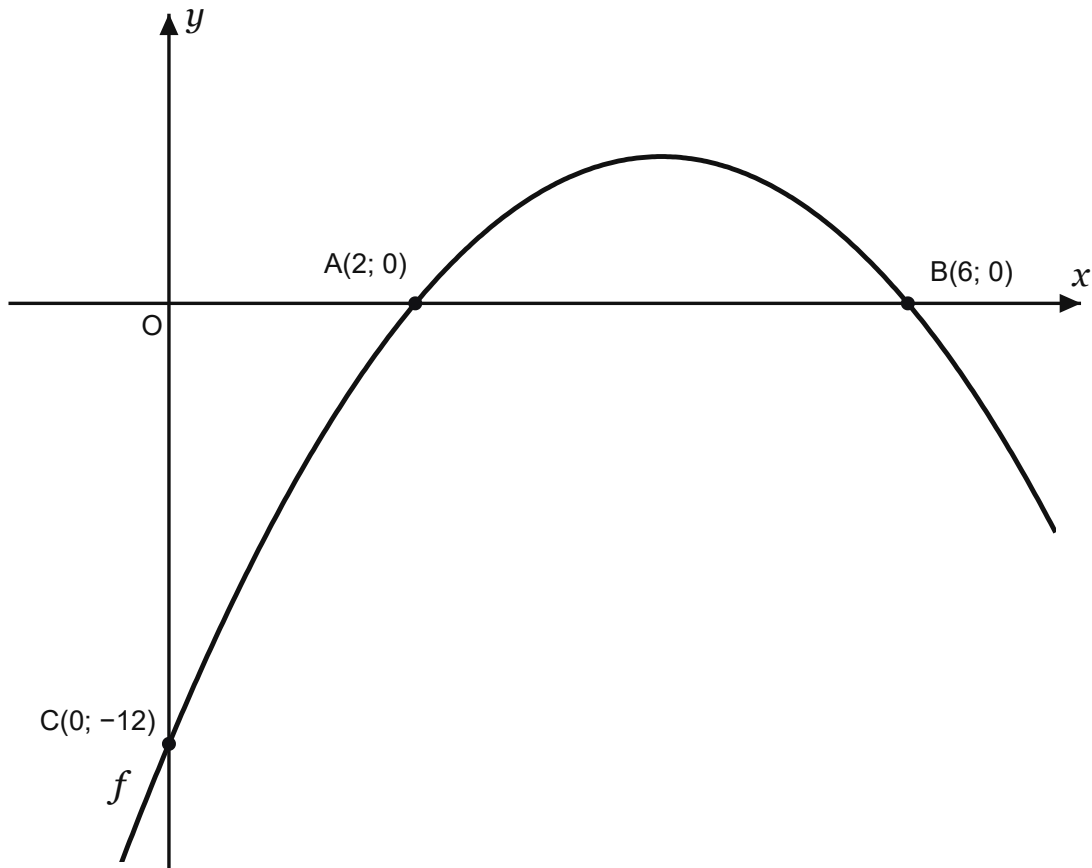
8 newly generated questions across all 10 functions and graphs topics the IEB examines in Paper I — 90 marks in all. Every answer is worked in the memorandum booklet. Nothing here is taken from a past paper.

The parabola

1

[10]

In the diagram below, the parabola f cuts the x -axis at $A(2; 0)$ and $B(6; 0)$, and the y -axis at $C(0; -12)$.



- (a) Determine the equation of f in the form $f(x) = ax^2 + bx + c$. (3)

Answer: _____

- (b) Determine the coordinates of the turning point of f . (2)

Answer: _____

- (c) Write down the range of f . (1)

Answer: _____

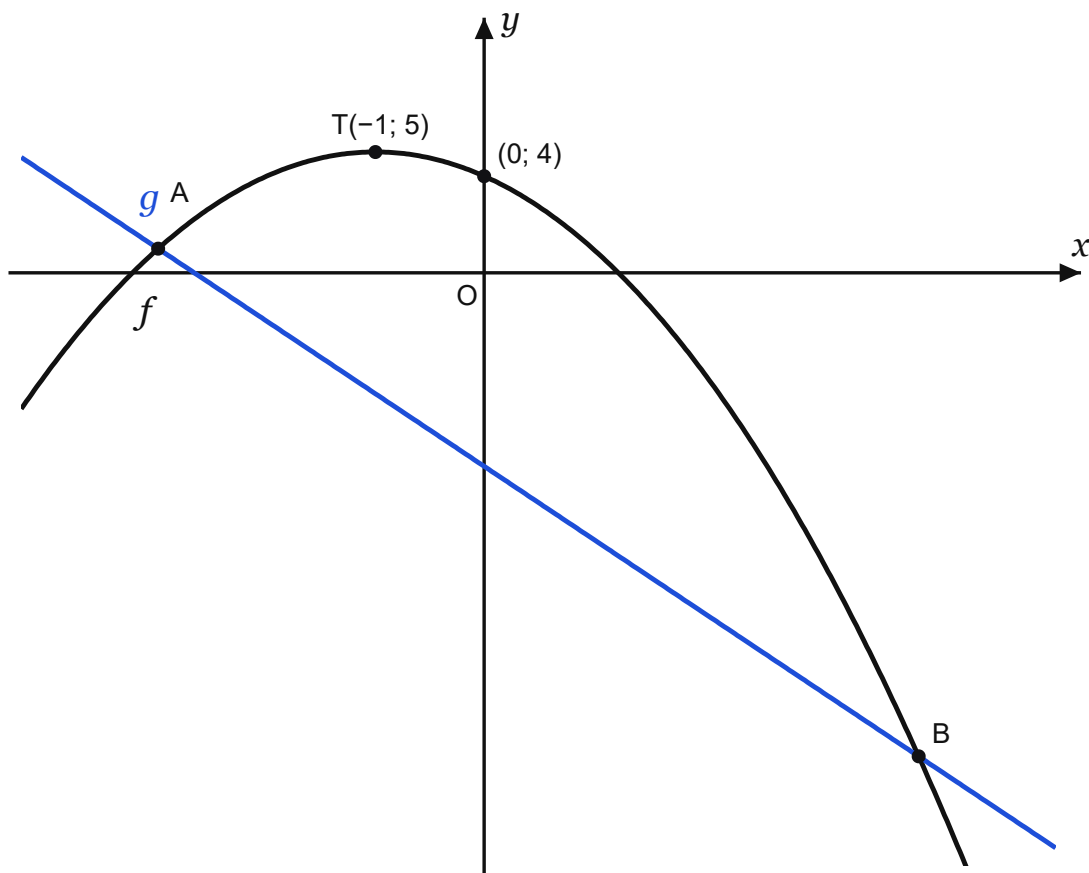
- (d) For which values of k will $f(x) = k$ have two different real roots? (2)

Answer: _____

- (e) The graph of f is moved 3 units to the left and 1 unit up to give g . Write down the coordinates of the turning point of g . (2)

Answer: _____

In the diagram below, the parabola f with turning point $T(-1; 5)$ and y -intercept $(0; 4)$, and the straight line g , are drawn. The graphs meet at A and B.



- (a) Determine the equation of f in the form $f(x) = a(x - p)^2 + q$. (3)

Answer: _____

- (b) $g(x) = -3x - 8$. Determine the coordinates of A and B, the points where f and g meet. (5)

Answer: _____

- (c) For which values of x is $f(x) \geq g(x)$? (2)

Answer: _____

- (d) Write down the range of f . (1)

Answer: _____

- (e) For which values of t will $f(x) = t$ have no real roots? (2)

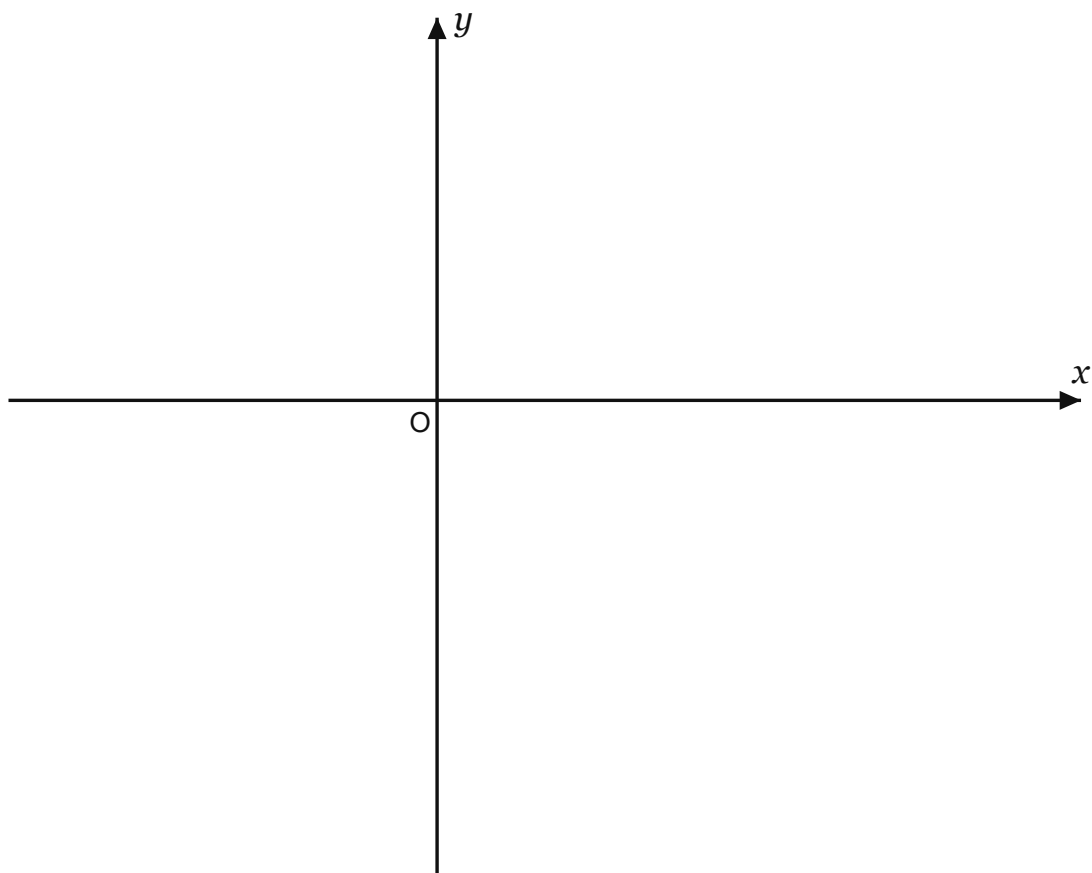
Answer: _____

The hyperbola

3

[12]

Given: $f(x) = -\frac{8}{x-3} - 2$



- (a) Determine $f(0)$. (1)

Answer: _____

- (b) Determine the value of x for which $f(x) = 0$. (2)

Answer: _____

- (c) Sketch the graph of f on the axes provided. Label clearly all asymptotes and intercepts with the axes. (5)

Answer: _____

- (d) Write down the domain of f . (1)

Answer: _____

(e) For which values of x is $f(x) > 0$?

(2)

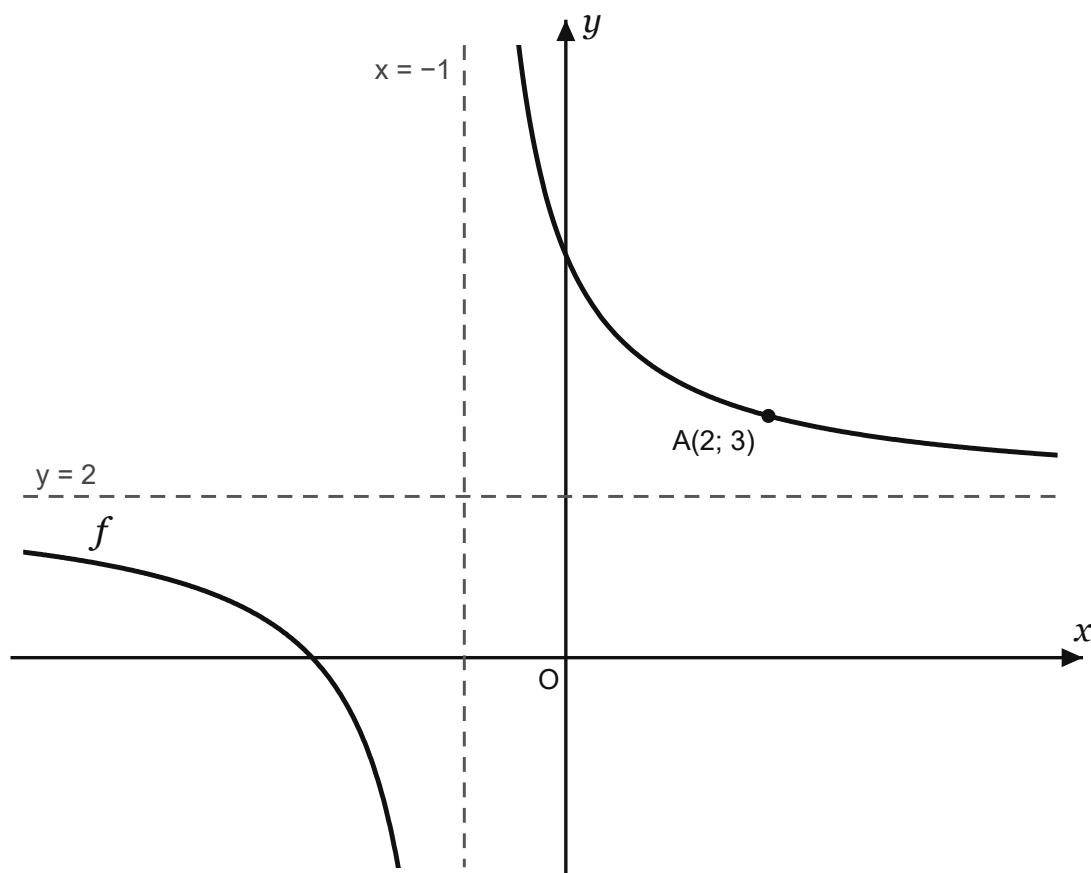
Answer: _____

(f) Write down the equation of the graph formed when f is reflected in the x -axis.

(1)

Answer: _____

In the diagram below, the graph of $f(x) = \frac{a}{x+p} + q$ is drawn with its asymptotes. A(2; 3) lies on f .



- (a) Write down the values of p and q . (2)

Answer: _____

- (b) Determine the value of a . (2)

Answer: _____

- (c) Determine the equations of the axes of symmetry of f . (2)

Answer: _____

- (d) The axis of symmetry $y = x + 3$ meets the graph of f at B and D. Determine the coordinates of B and D, leaving your answers in surd form where necessary. (3)

Answer: _____

- (e) Write down the domain of f . (1)

Answer: _____

-
- (f) For which values of x is $f(x) \geq 0$? (2)

Answer: _____

-
- (g) The graph of f is shifted 1 unit to the left and 2 units down to form g . Write down the equation of g . (2)

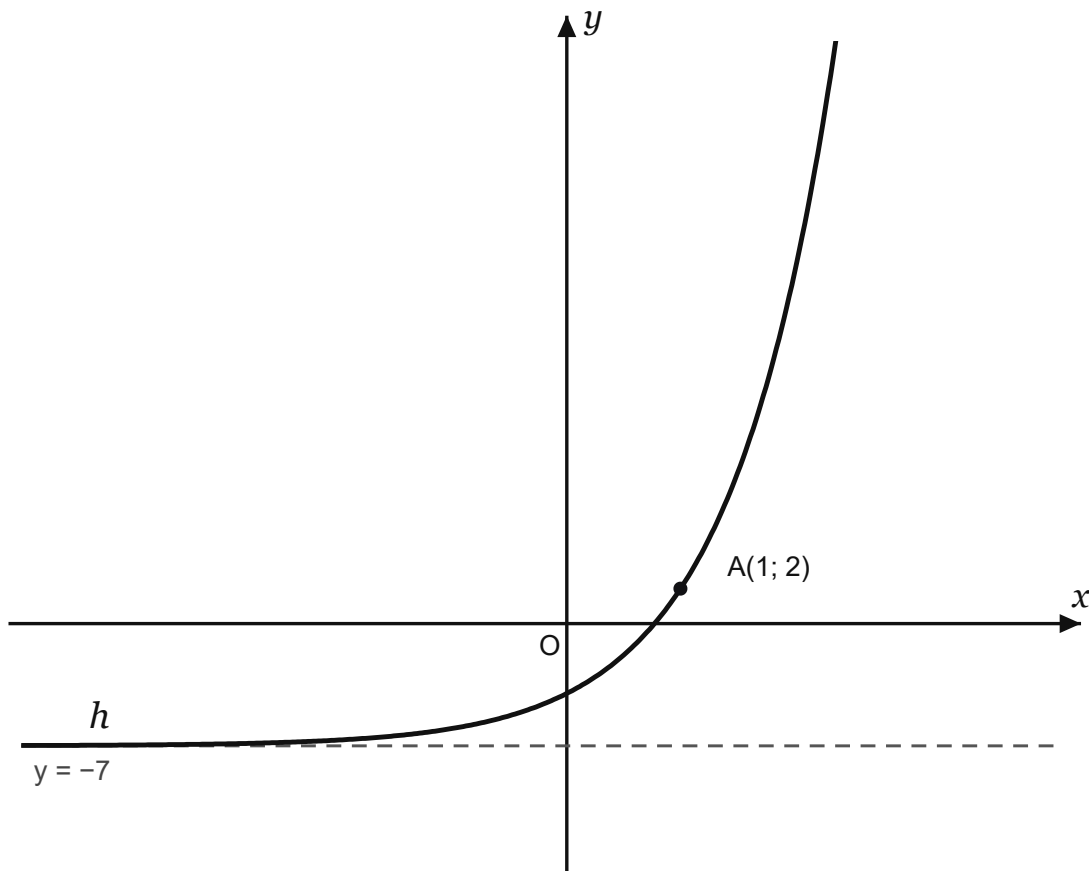
Answer: _____

Exponential equations and exponent laws

5

[11]

In the diagram below, the graph of $h(x) = 3^{x+p} + q$ is drawn. The line $y = -7$ is an asymptote of h , and A(1; 2) lies on h .



- (a) Write down the range of h . (1)

Answer: _____

- (b) Given that $h(x) = 3^{x+p} + q$, determine the values of p and q . (3)

Answer: _____

- (c) Determine the x -intercept of h , correct to two decimal places. (3)

Answer: _____

- (d) The graph of h is reflected in the y -axis to give k . Write down the equation of k . (2)

Answer: _____

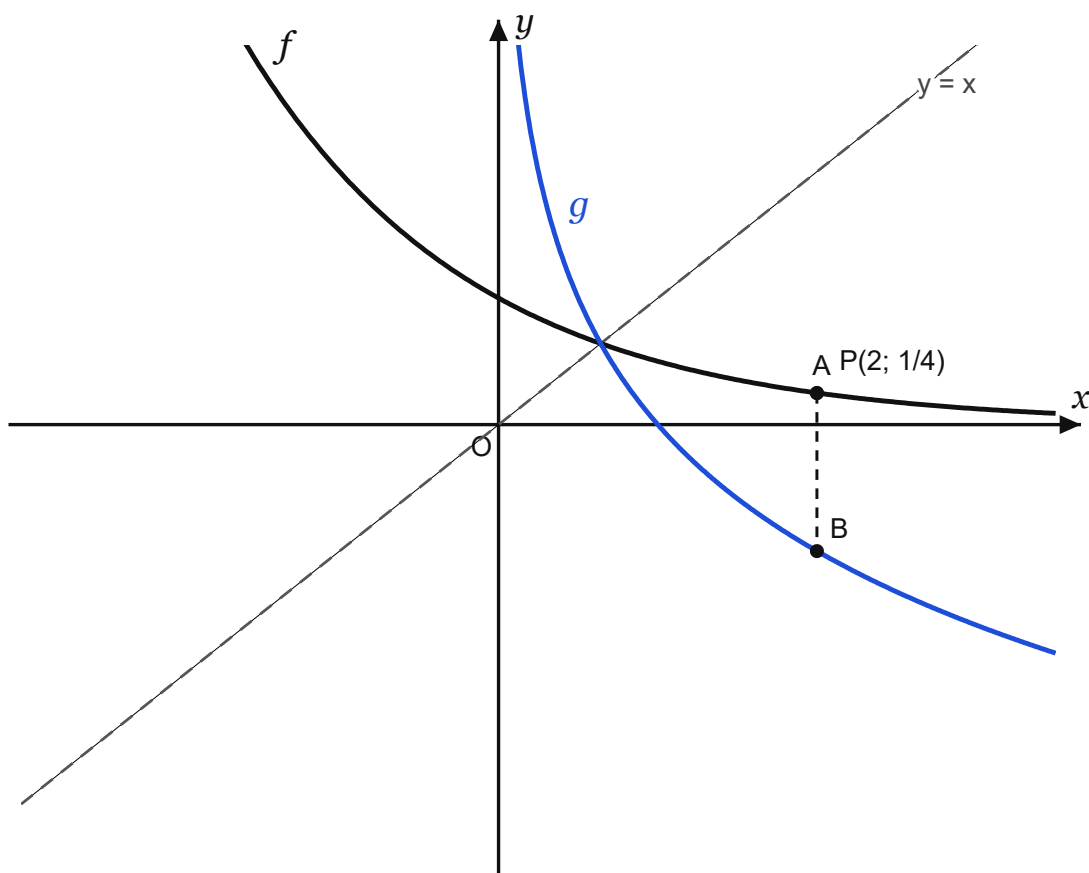
(e) For which values of x is $h(x) > 0$?

(2)

Answer: _____

In the diagram below, $f(x) = b^x$ and g , the reflection of f in the line $y = x$, are drawn.

$P(2; \frac{1}{4})$ lies on f .



- (a) Determine the value of b . (2)

Answer: _____

- (b) Write down the equation of g in the form $y = \dots$ (2)

Answer: _____

- (c) Write down the domain of g . (1)

Answer: _____

- (d) For which values of x is $g(x) > -1$? (2)

Answer: _____

- (e) The line $x = 2$ meets f at A and g at B. Determine the length of AB. (3)

Answer: _____

- (f) $h(x) = f(x) - 3$. Write down the equation of the asymptote of h and determine the x -intercept of h , correct to two decimal places. (3)

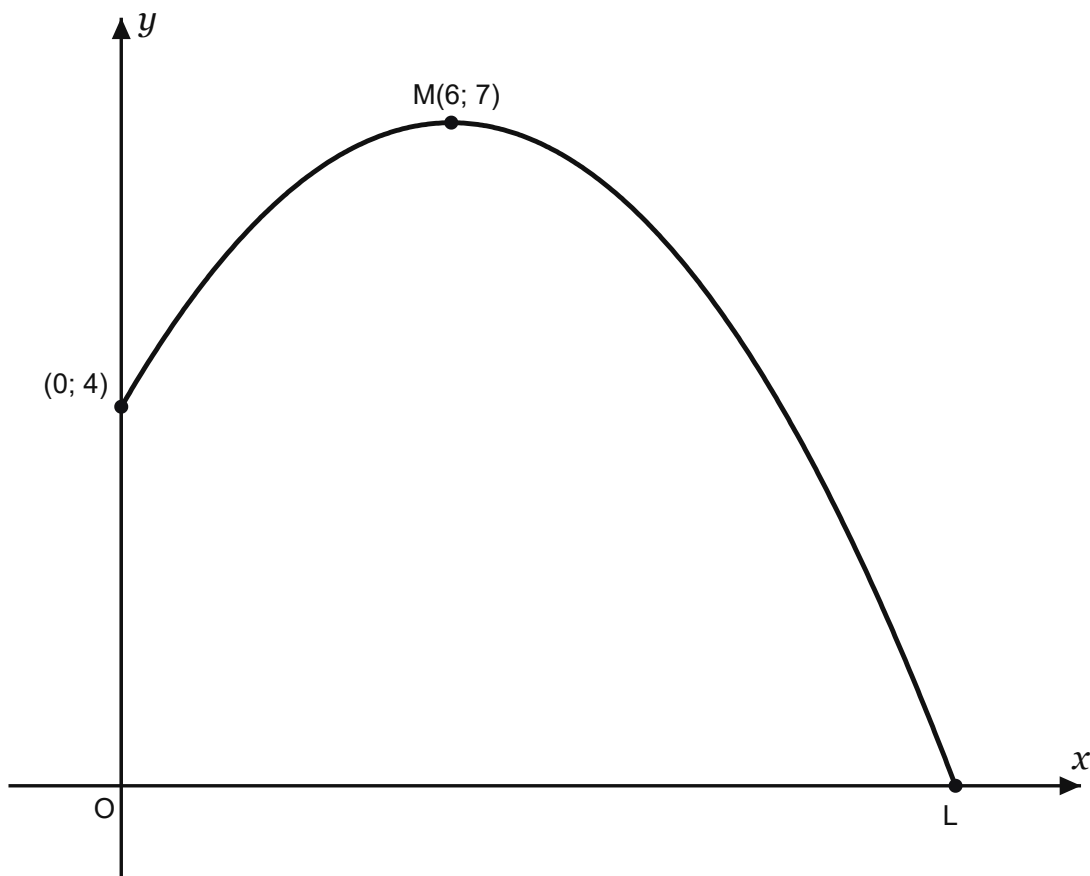
Answer: _____

Fitting a graph to something real

7

[8]

A ball is thrown from the top of a building 4 m high. It reaches its greatest height of 7 m at a horizontal distance of 6 m from the building. In the diagram the foot of the building is at the origin and the ground lies along the x -axis.



- (a) Determine the equation of the path of the ball in the form $y = a(x - p)^2 + q$. (3)

Answer: _____

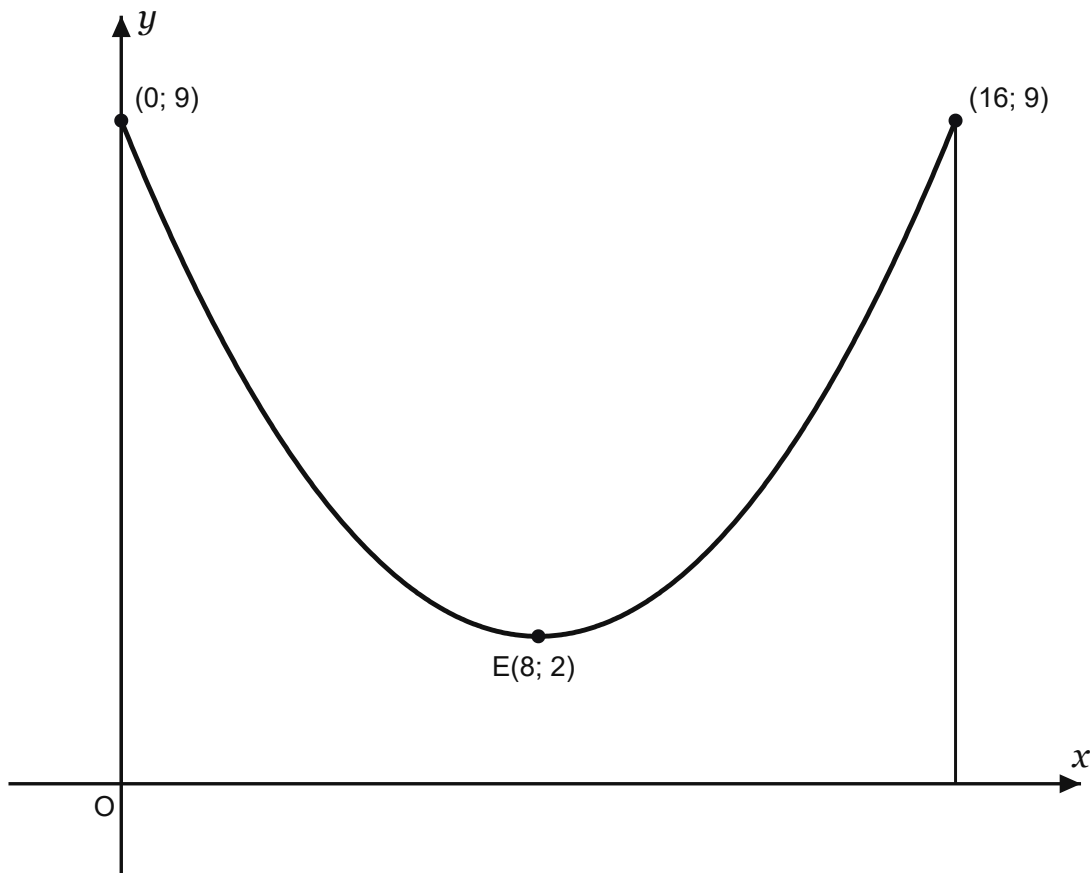
- (b) Calculate the height of the ball 11 m horizontally from the building. (2)

Answer: _____

- (c) Calculate, correct to two decimal places, how far from the building the ball lands at L. (3)

Answer: _____

A cable hangs between two poles, each 9 m high and 16 m apart. Its lowest point is 2 m above the ground, halfway between the poles. In the diagram the foot of the left pole is at the origin and the ground lies along the x -axis.



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- (a) Determine the equation of the cable in the form $y = a(x - p)^2 + q$. (3)

Answer: _____

-
- (b) Calculate the height of the cable 9 m horizontally from the left pole. (2)

Answer: _____

-
- (c) Determine, correct to two decimal places, the distances from the left pole at which the cable is 6 m above the ground. (4)

Answer: _____