



Mathematics
Standard level
Paper 2

Thursday 3 May 2018 (morning)

Candidate session number

1 hour 30 minutes

| | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|
| | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|

Instructions to candidates

- Write your session number in the boxes above.
- Do not open this examination paper until instructed to do so.
- A graphic display calculator is required for this paper.
- Section A: answer all questions. Answers must be written within the answer boxes provided.
- Section B: answer all questions in the answer booklet provided. Fill in your session number on the front of the answer booklet, and attach it to this examination paper and your cover sheet using the tag provided.
- Unless otherwise stated in the question, all numerical answers should be given exactly or correct to three significant figures.
- A clean copy of the **mathematics SL formula booklet** is required for this paper.
- The maximum mark for this examination paper is **[90 marks]**.

CLASES DE MATEMÁTICAS Y FÍSICA
BACHILLERATO INTERNACIONAL
WHATSAPP +51976438482
WWW.TEOTEVES.COM



Please **do not** write on this page.

Answers written on this page
will not be marked.

CLASES DE MATEMÁTICAS Y FÍSICA
BACHILLERATO INTERNACIONAL
WHATSAPP +51976438482
WWW.TEOTEVES.COM



16EP02

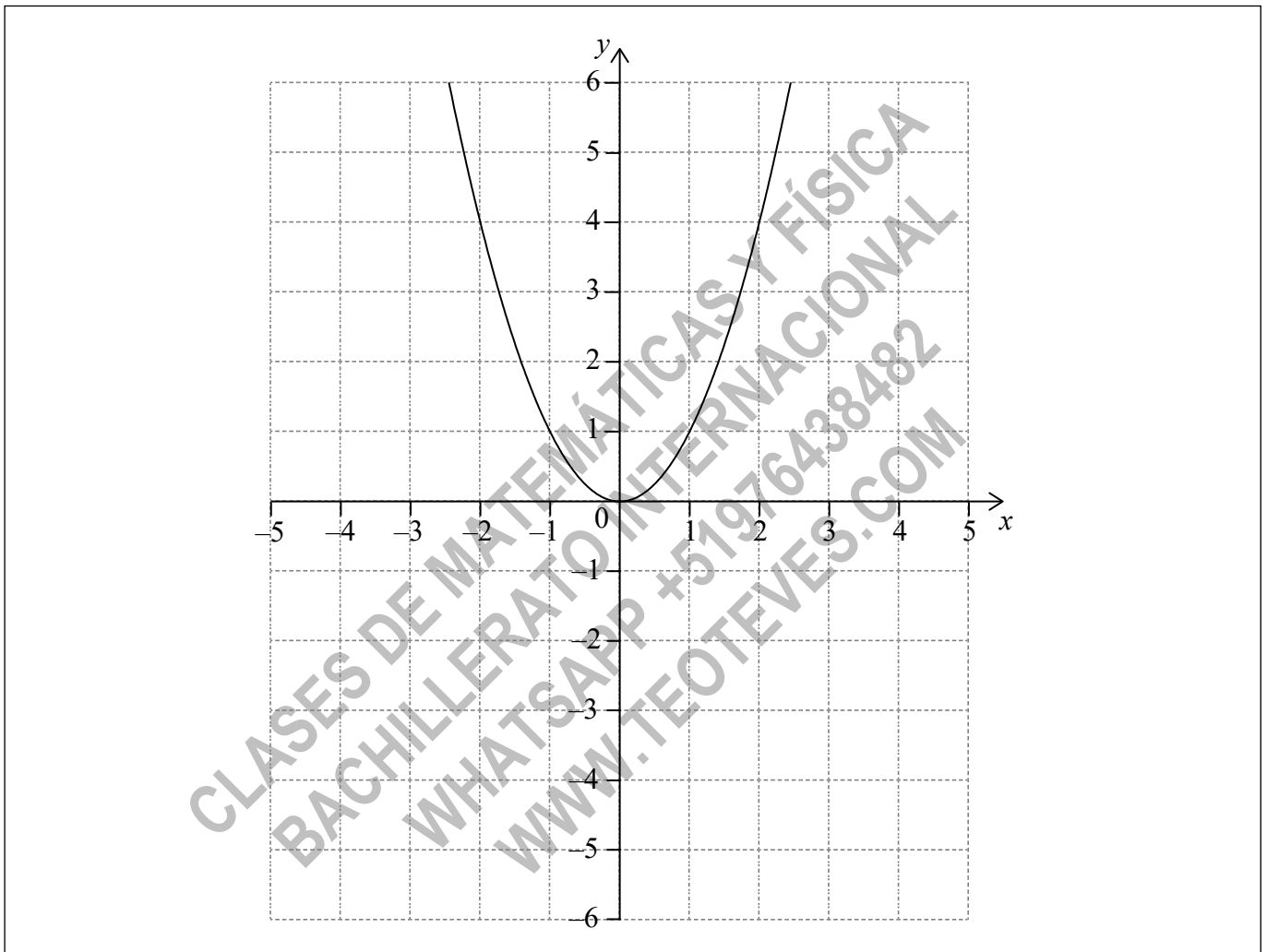
4. [Maximum mark: 7]

Let $g(x) = -(x - 1)^2 + 5$.

(a) Write down the coordinates of the vertex of the graph of g .

[1]

Let $f(x) = x^2$. The following diagram shows part of the graph of f .



The graph of g intersects the graph of f at $x = -1$ and $x = 2$.

(b) On the grid above, sketch the graph of g for $-2 \leq x \leq 4$.

[3]

(c) Find the area of the region enclosed by the graphs of f and g .

[3]

(This question continues on the following page)



16EP06

(Question 4 continued)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

CLASES DE MATEMÁTICAS Y FÍSICA
BACHILLERATO INTERNACIONAL
WHATSAPP +51976438482
WWW.TEOTEVES.COM



16EP07

Turn over

Please **do not** write on this page.

Answers written on this page
will not be marked.

CLASES DE MATEMÁTICAS Y FÍSICA
BACHILLERATO INTERNACIONAL
WHATSAPP +51976438482
WWW.TEOTEVES.COM



16EP08

5. [Maximum mark: 6]

Two events A and B are such that $P(A) = 0.62$ and $P(A \cap B) = 0.18$.

(a) Find $P(A \cap B')$. [2]

(b) Given that $P((A \cup B)') = 0.19$, find $P(A | B')$. [4]

CLASES DE MATEMÁTICAS Y FÍSICA
 BACHILLERATO INTERNACIONAL
 WHATSAPP +51976438482
 WWW.TEOTEVES.COM



16EP09

Turn over

6. [Maximum mark: 7]

Triangle ABC has $a = 8.1$ cm, $b = 12.3$ cm and area 15 cm². Find the largest possible perimeter of triangle ABC.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

CLASES DE MATEMÁTICAS Y FÍSICA
BACHILLERATO INTERNACIONAL
WHATSAPP +51976438482
WWW.TEOTEVES.COM



16EP10

Do **not** write solutions on this page.

Section B

Answer **all** questions in the answer booklet provided. Please start each question on a new page.

8. [Maximum mark: 13]

The following table shows values of $\ln x$ and $\ln y$.

| | | | | |
|---------|------|------|------|------|
| $\ln x$ | 1.10 | 2.08 | 4.30 | 6.03 |
| $\ln y$ | 5.63 | 5.22 | 4.18 | 3.41 |

The relationship between $\ln x$ and $\ln y$ can be modelled by the regression equation $\ln y = a \ln x + b$.

(a) Find the value of a and of b . [3]

(b) Use the regression equation to estimate the value of y when $x = 3.57$. [3]

The relationship between x and y can be modelled using the formula $y = kx^n$, where $k \neq 0$, $n \neq 0$, $n \neq 1$.

(c) By expressing $\ln y$ in terms of $\ln x$, find the value of n and of k . [7]



Do **not** write solutions on this page.

9. [Maximum mark: 17]

The weights, in grams, of oranges grown in an orchard, are normally distributed with a mean of 297 g. It is known that 79% of the oranges weigh more than 289 g and 9.5% of the oranges weigh more than 310 g.

(a) Find the probability that an orange weighs between 289 g and 310 g. [2]

The weights of the oranges have a standard deviation of σ .

(b) (i) Find the standardized value for 289 g.

(ii) Hence, find the value of σ . [5]

The grocer at a local grocery store will buy the oranges whose weights exceed the 35th percentile.

(c) To the nearest gram, find the minimum weight of an orange that the grocer will buy. [3]

The orchard packs oranges in boxes of 36.

(d) Find the probability that the grocer buys more than half the oranges in a box selected at random. [5]

The grocer selects two boxes at random.

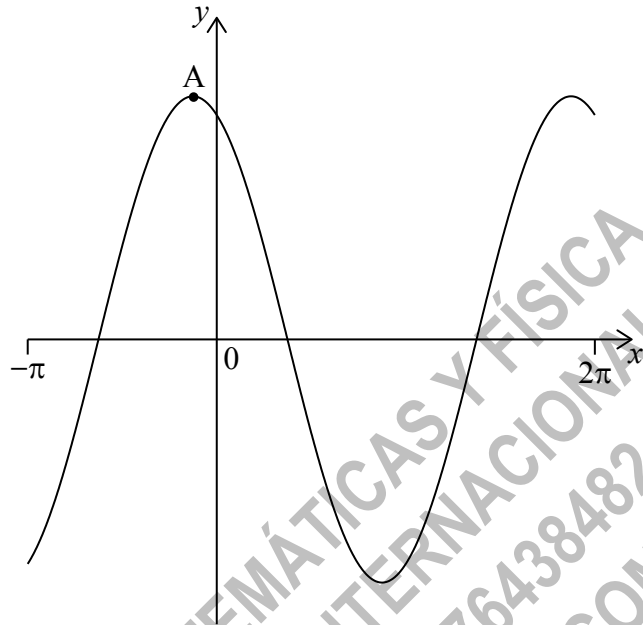
(e) Find the probability that the grocer buys more than half the oranges in each box. [2]



Do **not** write solutions on this page.

10. [Maximum mark: 15]

Let $f(x) = 12 \cos x - 5 \sin x$, $-\pi \leq x \leq 2\pi$, be a periodic function with $f(x) = f(x + 2\pi)$. The following diagram shows the graph of f .



There is a maximum point at A. The minimum value of f is -13 .

- (a) Find the coordinates of A. [2]
- (b) For the graph of f , write down
- (i) the amplitude;
 - (ii) the period. [2]
- (c) Hence, write $f(x)$ in the form $p \cos(x + r)$. [3]

(This question continues on the following page)



Do **not** write solutions on this page.

(Question 10 continued)

A ball on a spring is attached to a fixed point O. The ball is then pulled down and released, so that it moves back and forth vertically.

diagram not to scale



The distance, d centimetres, of the centre of the ball from O at time t seconds, is given by

$$d(t) = f(t) + 17, 0 \leq t \leq 5.$$

- (d) Find the maximum speed of the ball. [3]
- (e) Find the first time when the ball's speed is changing at a rate of 2 cm s^{-2} . [5]



Please **do not** write on this page.

Answers written on this page
will not be marked.



16EP16