INTERNATIONAL BACCALAUREATE
BACCALAURÉAT INTERNATIONAL
BACHILLERATO INTERNACIONAL

M00/520/S(1)

MATHEMATICAL METHODS
STANDARD LEVEL
PAPER 1

Wednesday 3 May 2000 (afternoon)

1 hour

Name

Number

INSTRUCTIONS TO CANDIDATES

- Write your name and candidate number in the boxes above.
- Do not open this examination paper until instructed to do so.
- Answer all the questions in the spaces provided.
- Unless otherwise stated in the question, all numerical answers must be given exactly or to three significant figures as appropriate.
- Write the make and model of your calculator in the box below *e.g.* Casio *fx-7400G*, Sharp EL-9400, Texas Instruments TI-80.

Calculator

Make	Model

EXAMINER	TEAM LEADER	IBCA
TOTAL /60	TOTAL /60	TOTAL /60

Maximum marks will be given for correct answers. Where an answer is wrong, some marks may be given for a correct method provided this is shown by written working. Working may be continued below the box, if necessary. Where graphs from a graphic display calculator are being used to find solutions, you should sketch these graphs as part of your answer.

1. In an arithmetic sequence, the first term is 5 and the fourth term is 40 . Find the second term.

Working:

Answer:

2. Two functions f, g are defined as follows:

$$f : x \to 3x + 5$$
$$g : x \to 2(1 - x)$$

Find

(a) $f^{-1}(2)$;

(b) $(g \circ f)(-4)$.

Working:

Answers:

(a) _____

(b) _____

3. In a survey, 100 students were asked 'do you prefer to watch television or play sport?' Of the 46 boys in the survey, 33 said they would choose sport, while 29 girls made this choice.

	Boys	Girls	Total
Television			
Sport	33	29	
Total	46		100

By completing this table or otherwise, find the probability that

(a) a student selected at random prefers to watch television;

(b) a student prefers to watch television, given that the student is a boy.

Working:

Answers:

(a) _____

(b) _____

4. The vectors $\boldsymbol{u}$, $\boldsymbol{v}$ are given by $\boldsymbol{u} = 3\boldsymbol{i} + 5\boldsymbol{j}$, $\boldsymbol{v} = \boldsymbol{i} - 2\boldsymbol{j}$.

Find scalars a , b such that $a(\boldsymbol{u} + \boldsymbol{v}) = 8\boldsymbol{i} + (b - 2)\boldsymbol{j}$.

Working:

Answer:

5. If $\log_a 2 = x$ and $\log_a 5 = y$, find in terms of x and y , expressions for

(a) $\log_2 5$;

(b) $\log_a 20$.

Working:

Answers:

(a)

(b)

6. Solve the equation $3 \cos x = 5 \sin x$, for x in the interval $0° \leq x \leq 360°$, giving your answers to the nearest degree.

Working:

Answers:

7. Find a vector equation of the line passing through $(-1, 4)$ and $(3, -1)$. Give your answer in the form $\boldsymbol{r} = \boldsymbol{p} + t\boldsymbol{d}$, where $t \in \mathbb{R}$.

Working:

Answer:

8. Find the coordinates of the point on the graph of $y = x^2 - x$ at which the tangent is parallel to the line $y = 5x$.

Working:

Answer:

9. If $f'(x) = \cos x$, and $f\left(\frac{\pi}{2}\right) = -2$, find $f(x)$.

Working:

Answer:

10. Find the sum of the infinite geometric series

$$\frac{2}{3} - \frac{4}{9} + \frac{8}{27} - \frac{16}{81} + \ldots$$

Working:

Answer:

11. Find the coefficient of a^5b^7 in the expansion of $(a + b)^{12}$.

Working:

Answer:

12. If A is an obtuse angle in a triangle and $\sin A = \frac{5}{13}$, calculate the exact value of $\sin 2A$.

Working:

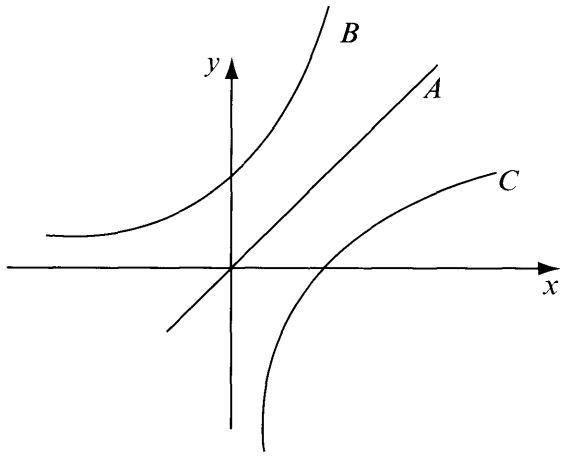
Answer:

13. The quadratic equation $4x^2 + 4kx + 9 = 0$, $k > 0$ has exactly one solution for x. Find the value of k.

Working:

Answer:

14. The diagram shows three graphs.



A is part of the graph of $y = x$.

B is part of the graph of $y = 2^x$.

C is the reflection of graph B in line A.

Write down

(a) the equation of C in the form $y = f(x)$;

(b) the coordinates of the point where C cuts the x-axis.

Working:

Answers:

(a) _____

(b) _____

15. Let $f(x) = x^3$.

(a) Evaluate $\dfrac{f(5 + h) - f(5)}{h}$ for $h = 0.1$.

(b) What number does $\dfrac{f(5 + h) - f(5)}{h}$ approach as h approaches zero?

Working:

Answers:

(a) _____

(b) _____