



## Cambridge International AS & A Level

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**MATHEMATICS**

**9709/11**

Paper 1 Pure Mathematics 1

**May/June 2020**

**1 hour 50 minutes**

You must answer on the question paper.

You will need: List of formulae (MF19)

### INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- If additional space is needed, you should use the lined page at the end of this booklet; the question number or numbers must be clearly shown.
- You should use a calculator where appropriate.
- You must show all necessary working clearly; no marks will be given for unsupported answers from a calculator.
- Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place for angles in degrees, unless a different level of accuracy is specified in the question.

### INFORMATION

- The total mark for this paper is 75.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **20** pages. Blank pages are indicated.







3 Each year the selling price of a diamond necklace increases by 5% of the price the year before. The selling price of the necklace in the year 2000 was \$36 000.

(a) Write down an expression for the selling price of the necklace  $n$  years later and hence find the selling price in 2008. [3]

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(b) The company that makes the necklace only sells one each year. Find the total amount of money obtained in the ten-year period starting in the year 2000. [2]

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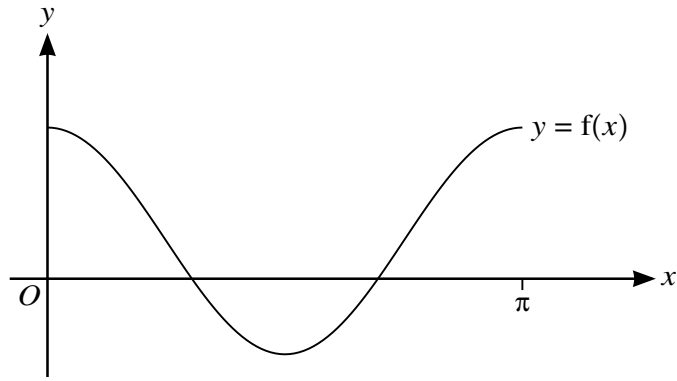
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The diagram shows the graph of  $y = f(x)$ , where  $f(x) = \frac{3}{2} \cos 2x + \frac{1}{2}$  for  $0 \leq x \leq \pi$ .

- (a) State the range of  $f$ . [2]

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A function  $g$  is such that  $g(x) = f(x) + k$ , where  $k$  is a positive constant. The  $x$ -axis is a tangent to the curve  $y = g(x)$ .

- (b) State the value of  $k$  and hence describe fully the transformation that maps the curve  $y = f(x)$  on to  $y = g(x)$ . [2]

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- (c) State the equation of the curve which is the reflection of  $y = f(x)$  in the  $x$ -axis. Give your answer in the form  $y = a \cos 2x + b$ , where  $a$  and  $b$  are constants. [1]

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5 The equation of a line is  $y = mx + c$ , where  $m$  and  $c$  are constants, and the equation of a curve is  $xy = 16$ .

(a) Given that the line is a tangent to the curve, express  $m$  in terms of  $c$ . [3]

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(b) Given instead that  $m = -4$ , find the set of values of  $c$  for which the line intersects the curve at two distinct points. [3]

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(b) Find the equation of the tangent,  $T$ , to circle  $C$  at the point  $B$ . [4]

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(c) Find the equation of the circle which is the reflection of circle  $C$  in the line  $T$ . [3]

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