Edexcel C1 Specimen Paper

Answer all questions. Time : 1 hour 30 minutes

1.   Calculate $\displaystyle\sum_{r=1}^{20} 5 + 2r$ **(3)**

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2.   Find $\displaystyle\int 5x + 3\sqrt{x}\ dx$ **(4)**

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3.   (a) Express $\sqrt{80}$ in the form $a\sqrt{5}$, where a is an integer.   **(1)**

    (b) Express $(4 - \sqrt{5})^2$ in the form $b + c\sqrt{5}$, where b and c are integers.   **(3)**

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4.   The points A and B have coordinates $(3, 4)$ and $(7, -6)$ respectively. The straight line l passes through A and is perpendicular to AB. Find an equation for l, giving your answer in the form $ax + by + c = 0$, where a, b and c are integers. **(5)**
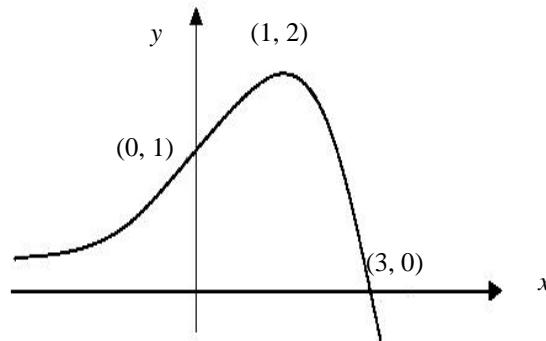

5.

Figure 1

Figure 1 shows a sketch of the curve with equation $y = f(x)$.

The curve crosses the coordinate axes at the points $(0, 1)$ and $(3, 0)$. The maximum point on the curve is $(1, 2)$.

On separate diagrams, sketch the curve with equation

(a) $y = f(x + 1)$,   **(3)**

(b) $y = f(2x)$.   **(3)**

On each diagram, show clearly the coordinates of the maximum point, and of each point at which the curve crosses the coordinate axes.

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6.   (a) Solve the simultaneous equations

$$y + 2x = 5,$$
$$2x^2 - 3x - y = 16.$$ **(6)**

(b) Hence, or otherwise, find the set of values of x for which

$$2x^2 - 3x - 16 > 5 - 2x$$ **(3)**

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7. Ahmed plans to save £250 in the year 2001, £300 in 2002, £350 in 2003, and so on until the year 2020. His planned savings form an arithmetic sequence with common difference £50.

(a) Find the amount he plans to save in the year 2011. **(2)**

(b) Calculate his total planned savings over the 20 year period from 2001 to 2020. **(3)**

Ben also plans to save money over the same 20 year period. He saves £A in the year 2001 and his planned yearly savings form an arithmetic sequence with common difference £60.

Given that Ben's total planned savings over the 20 year period are equal to Ahmed's total planned savings over the same period,

(c) calculate the value of A. **(4)**

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8. Given that
$$x^2 + 10x + 36 = (x + a)^2 + b$$
where a and b are constants,

(a) find the value of a and the value of b. **(3)**

(b) Hence show that the equation $x^2 + 10x + 36 = 0$ has no real roots. **(2)**

The equation $x^2 + 10x + k = 0$ has equal roots.

(c) Find the value of k. **(2)**

(d) For this value of k, sketch the graph of $y = x^2 + 10x + k$, showing the coordinates of any points at which the graph meets the coordinate axes. **(4)**

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9. The curve C has equation $y = f(x)$ and the point $P(3, 5)$ lies on C.

Given that
$$f(x) = 3x^2 - 8x + 6,$$

(a) find f(x). **(4)**

(b) Verify that the point (2, 0) lies on *C*. **(2)**

The point *Q* also lies on *C*, and the tangent to *C* at *Q* is parallel to the tangent to *C* at *P*.

(c) Find the *x*-coordinate of *Q*. **(5)**

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10.   The curve *C* has equation $y = x^3 - 5x + \dfrac{2}{x}$, $x \neq 0$.

The points *A* and *B* both lie on *C* and have coordinates (1, −2) and (−1, 2) respectively.

(a) Show that the gradient of *C* at *A* is equal to the gradient of *C* at *B*. **(5)**

(b) Show that an equation for the normal to *C* at *A* is $4y = x - 9$. **(4)**

The normal to *C* at *A* meets the *y*-axis at the point *P*. The normal to *C* at *B* meets the *y*-axis at the point *Q*.

(c) Find the length of *PQ*. **(4)**

END