FOR EDEXCEL

GCE Examinations

Advanced Subsidiary

Core Mathematics C1

Paper K

Time: 1 hour 30 minutes

Instructions and Information

Candidates may NOT use a calculator in this paper

Full marks may be obtained for answers to ALL questions.

Mathematical formulae and statistical tables are available.

This paper has ten questions.

Advice to Candidates

You must show sufficient working to make your methods clear to an examiner. Answers without working may gain no credit.



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1. Find the value of y such that

$$4^{y+3} = 8. \qquad \textbf{(3)}$$

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2. Find

$$\int \left(3x^2 + \frac{1}{2x^2}\right)\, dx. \qquad \textbf{(4)}$$

3.

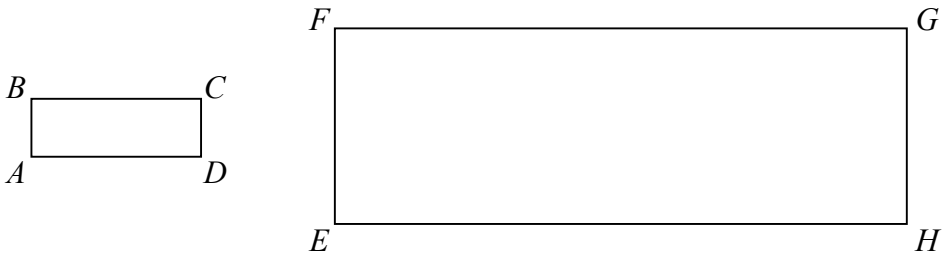


Figure 1

Figure 1 shows the rectangles $ABCD$ and $EFGH$ which are similar.

Given that $AB = (3 - \sqrt{5})$ cm, $AD = \sqrt{5}$ cm and $EF = (1 + \sqrt{5})$ cm, find the length EH in cm, giving your answer in the form $a + b\sqrt{5}$ where a and b are integers. **(6)**

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4. *(a)* Sketch on the same diagram the curves $y = x^2 - 4x$ and $y = -\frac{1}{x}$. **(4)**

(b) State, with a reason, the number of real solutions to the equation

$$x^2 - 4x + \frac{1}{x} = 0. \qquad \textbf{(2)}$$

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5. *(a)* By completing the square, find in terms of the constant k the roots of the equation

$$x^2 + 2kx + 4 = 0. \qquad \textbf{(4)}$$

(b) Hence find the exact roots of the equation

$$x^2 + 6x + 4 = 0. \qquad \textbf{(2)}$$

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6. *(a)* Evaluate

$$\sum_{r=1}^{50} (80 - 3r).$$ **(3)**

(b) Show that

$$\sum_{r=1}^{n} \frac{r+3}{2} = kn(n + 7),$$

where k is a rational constant to be found. **(4)**

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7. Solve the simultaneous equations

$$x - 3y + 7 = 0$$

$$x^2 + 2xy - y^2 = 7$$ **(7)**

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8. Given that

$$\frac{dy}{dx} = \frac{x^3 - 4}{x^3}, \quad x \neq 0,$$

(a) find $\frac{d^2y}{dx^2}$. **(3)**

Given also that $y = 0$ when $x = -1$,

(b) find the value of y when $x = 2$. **(6)**

Turn over

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9. A curve has the equation $y = (\sqrt{x} - 3)^2,\ x \geq 0$.

(a) Show that $\frac{dy}{dx} = 1 - \frac{3}{\sqrt{x}}$. **(4)**

The point P on the curve has x-coordinate 4.

(b) Find an equation for the normal to the curve at P in the form $y = mx + c$. **(5)**

(c) Show that the normal to the curve at P does not intersect the curve again. **(4)**

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10. The straight line l has gradient 3 and passes through the point A (−6, 4).

(a) Find an equation for l in the form $y = mx + c$. **(2)**

The straight line m has the equation $x - 7y + 14 = 0$.

Given that m crosses the y-axis at the point B and intersects l at the point C,

(b) find the coordinates of B and C, **(4)**

(c) show that $\angle BAC = 90°$, **(4)**

(d) find the area of triangle ABC. **(4)**

END

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