AQA – Further algebra and functions – A2 Further Mathematics P2

1. June/2020/Paper_2/No.5

Solve the inequality

2x + 3	_	·	_	5
$\overline{x-1}$	_	л	+	•

x-1	[5 marks]
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	[5 marks

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(a) Starting from the series given in the formulae booklet, show that the general term of the Maclaurin series for

$$\frac{\sin x}{x} - \cos x$$

is

$(-1)^{r+1} \frac{2r}{(2r+1)!} x^{2r}$	[4 marks]

(b	Show	that
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$\lim_{x \to 0} \left[\frac{\frac{\sin x}{x} - \cos x}{1 - \cos x} \right] = \frac{2}{3}$	
L J	[4 marks

June/2019/Paper 2/No.2

Which of the straight lines given below is an asymptote to the curve

$$y = \frac{ax^2}{x - 1}$$

where a is a non-zero constant?

Circle your answer.

[1 mark]

$$v = ax + a$$

$$v = ax$$

$$y = ax + a$$
 $y = ax$ $y = ax - a$ $y = a$

$$v = a$$

5. June/2019/Paper_2/No.3

The set A is defined by $A = \{x : -\sqrt{2} < x < 0\} \cup \{x : 0 < x < \sqrt{2}\}$

Which of the inequalities given below has A as its solution?

Circle your answer.

[1 mark]

$$|x^2 - 1| > 1$$

$$|x^2 - 1| > 1$$

$$|x^2 - 1| < 1$$

$$|x^2 - 1| > 1$$
 $|x^2 - 1| \ge 1$ $|x^2 - 1| < 1$ $|x^2 - 1| \le 1$

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6. June/2019/Paper_2/No.4

The positive integer \boldsymbol{k} is such that

$$\sum_{r=1}^{k} (3r - k) = 90$$

Find the value of k .	[3 marks]
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7. June/2019/Paper_2/No.8

A parabola P_1 has equation $y^2 = 4ax$ where a > 0

 P_1 is translated by the vector $\begin{bmatrix} b \\ 0 \end{bmatrix}$, where b>0, to give the parabola P_2

(a) The line y = mx is a tangent to P_2

Prove that $m=\pm\sqrt{\frac{a}{b}}$

Solutions using differentiation will be given no marks.	[4 marks]

(b)	The line $y = \sqrt{\frac{a}{b}}x$ meets P_2 at the point D .
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The finite region R is bounded by the x-axis, P_2 and a line through D perpendicular to the x-axis.

The region R is rotated through 2π radians about the x-axis to form a solid.

Find, in terms of a and b, the volume of this solid.

[5 marks