Indices and surds – 2021 O Level Additional Math

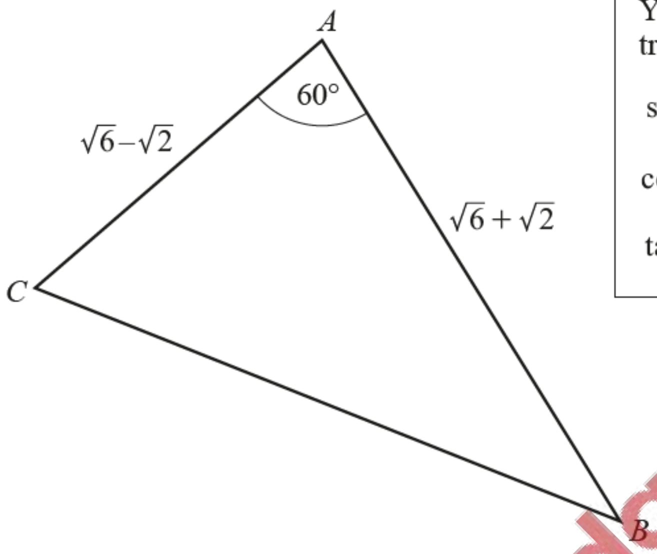
1. Nov/2021/Paper_12/No.2

(a) Given that $\dfrac{\sqrt[3]{xy}(zy)^2}{(xz)^{-3}\sqrt{z}} = x^a y^b z^c$, find the exact values of the constants a, b and c. [3]

(b) Solve the equation $5(2^{2p+1}) - 17(2^p) + 3 = 0$. [4]

2. Nov/2021/Paper_22/No.6

DO NOT USE A CALCULATOR IN THIS QUESTION.
All lengths in this question are in centimetres.



You may use the following trigonometrical ratios.

$\sin 60° = \frac{\sqrt{3}}{2}$

$\cos 60° = \frac{1}{2}$

$\tan 60° = \sqrt{3}$

The diagram shows triangle ABC with $AC = \sqrt{6}-\sqrt{2}$, $AB = \sqrt{6}+\sqrt{2}$ and angle $CAB = 60°$.

(a) Find the exact length of BC. [3]

(b) Show that $\sin ACB = \frac{\sqrt{6}+\sqrt{2}}{4}$. [2]

(c) Show that the perpendicular distance from A to the line BC is 1. [2]

3. Nov/2021/Paper_23/No.4c

(c) Solve the equation $\dfrac{3^v}{27^{2v-5}} = 9$. [3]

4. June/2021/Paper_11/No.8a

DO NOT USE A CALCULATOR IN THIS QUESTION.

A curve has equation $y = (2-\sqrt{3})x^2 + x - 1$. The x-coordinate of a point A on the curve is $\dfrac{\sqrt{3}+1}{2-\sqrt{3}}$.

(a) Show that the coordinates of A can be written in the form $(p+q\sqrt{3}, r+s\sqrt{3})$, where p, q, r and s are integers. [5]

5. June/2021/Paper_12/No.1

Write $\dfrac{(pqr)^{-2}r^{\frac{1}{3}}}{\left(p^2r\right)^{-1}q^3}$ in the form $p^a q^b r^c$, where a, b and c are constants. [3]

6. June/2021/Paper_12/No.6

DO NOT USE A CALCULATOR IN THIS QUESTION.

A curve has equation $y = (3+\sqrt{5})x^2 - 8\sqrt{5}x + 60$.

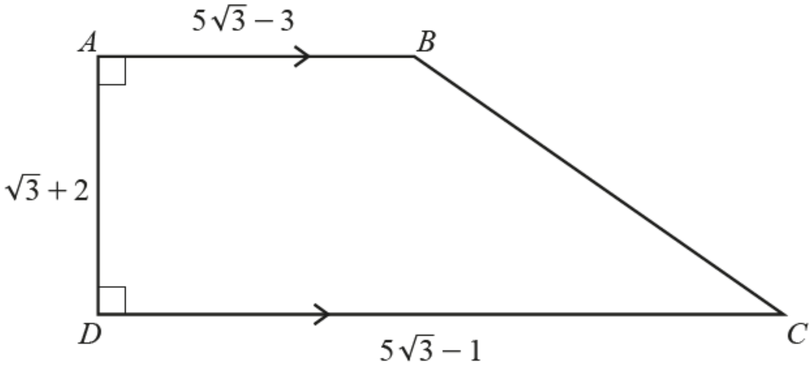
(a) Find the x-coordinate of the stationary point on the curve, giving your answer in the form $a + b\sqrt{5}$, where a and b are integers. [4]

(b) Hence find the y-coordinate of this stationary point, giving your answer in the form $c\sqrt{5}$, where c is an integer. [3]

7. June/2021/Paper_14/No.9a

In this question all lengths are in centimetres.

Do not use a calculator in this question.



The diagram shows the trapezium $ABCD$, where $AB = 5\sqrt{3}-3$, $DC = 5\sqrt{3}-1$ and $AD = \sqrt{3}+2$.

(a) Find the area of $ABCD$, giving your answer in the form $a+b\sqrt{3}$, where a and b are integers. [3]

8. June/2021/Paper_24/No.1

Find the exact solution of the equation $\dfrac{p^{\frac{3}{2}}+p^{\frac{1}{2}}}{p^{-\frac{1}{2}}}=4$. [3]