A-level Further Maths

Introduction to radians

If you were unable to attend the taster session, you might find it helpful to watch the video on the next page before attempting the compulsory further maths task.

Trig_II_1_radians_intro (vimeo.com)

Trigonometry

This video covers:

- What is a radian?
- Converting between degrees and radians

integral

Now work through the Further Maths task on radians.

Please complete and mark your work in a notebook or on A4 paper which you can hand in when you arrive at your first lesson in September.
Please don't complete your transition task for all your subjects in the same book as we will want to take in your work for checking.

A-level Further Maths

Optional task

- The next slides give solutions to the first few optional questions.
- Do your best to answer the question before watching the solution.
- If you are stuck, you could try watching the solution and pause it once you have enough of a hint to finish it off yourself!
- Email dcrocker@coombedean.co.uk if you need more help.

1

(i) Simplify $\sqrt{50}+\sqrt{18}$.

(ii) Express $(3+2\sqrt{5})^3$ in the form $a+b\sqrt{5}$ where a and b are integers.

(iii) Expand and simplify

$$(1-\sqrt{2}+\sqrt{6})^2\,.$$

(iv) **(a)** Expand and simplify $(1+\sqrt{2})^2$.

(b) Find all real values of x that satisfy

$$x^2+\frac{4}{x^2}=12\,.$$

Leave your answers in the form of surds.

04 June 2023 18:24

1

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(b) Find all real values of x that satisfy

$$x^2 + \frac{4}{x^2} = 12 .$$

Leave your answers in the form of surds.

Independent Task

Your task is:

(i) Simplify $\sqrt{48}+\sqrt{192}-2\sqrt{27}$

(ii) Express $\left(2-3\sqrt{7}\right)^3$ in the form $a+b\sqrt{7}$ where a and b are integers.

(iii) Expand and simplify $\left(2-\sqrt{3}+\sqrt{5}\right)^3$

(iv) (a) Expand and simplify $\left(1+\sqrt{3}\right)^2$

(b) Find all the real values of x that satisfy

$$x^4+\frac{36}{x^4}=24$$

Leave your answers in the form of surds.

This task should take **25 minutes**. You should complete it in the post 16 study area.

Once complete, submit your task

Deadline: Today **Time**: 3 pm

You also have a task/tasks to complete over the summer. This task must be handed in on your first lesson in September. Completing the task is part of your conditions of acceptance on the course.

The task will be available on the school website from today.

Task details:

Complete introduction to radians

Also, try some of the optional questions.

2

(i) Solve the equation:

$$\frac{2}{x+3} + \frac{1}{x+1} = 1\,.$$

(ii) Find the value(s) of b for which the following equation has a single (repeated) root.

$$9x^2 + bx + 4 = 0\,.$$

(iii) Find the range of (real) values of c for which the following equation has no real roots:

$$3x^2 + 5cx + c = 0\,.$$

2

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3*

In this question a and b are distinct, non-zero real numbers, and c is a real number.

(i) Show that, if a and b are either both positive or both negative, then the equation

$$\frac{x}{x-a} + \frac{x}{x-b} = 1$$

has two distinct real solutions.

(ii) Show that, if $c \neq 1$, the equation

$$\frac{x}{x-a} + \frac{x}{x-b} = 1 + c$$

has exactly one real solution if

$$c^2 = -\frac{4ab}{(a-b)^2}\,.$$

Show that this condition can be written

$$c^2 = 1 - \left(\frac{a+b}{a-b}\right)^2$$

and deduce that it can only hold if $0 < c^2 \leqslant 1$.