**Y13 A level Mathematics**

**23 Trigonometry 3 lessons**

## Teaching objectives

**a** Introduction to radians

**b** Small angle approximations

**c** Using exact values in radians

**Resources for advance preparation:**

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|  | **Starter** | **Main teaching**Including key questions, key teaching points, models and resources | **Notes**Including Support and Extension | **Consolidation/Plenary**Including key questions and homework |
| **1** | Create any angle measure and discuss arbitrary nature of degrees [Angies](https://drive.google.com/file/d/0B4bEjiUzbc3cMmVsN2RrYlRvQ3M/view?usp=sharing) | * Finding angle where arc length = r
* Definition of a radian as ratio of arc length to radius
* Working with radians to solve problems eg [finding arc length](https://drive.google.com/file/d/0B4bEjiUzbc3cWmZoVDRmTGNVbnc/view?usp=sharing)
 | Alternatively, link this unit with unit 30, and introduce radian measure in the context of differentiating trig functions, using a graph plotter. | Calculating area of sectors, segments, and arc lengths I radians. |
| **2** | Identifying standard angles in radians. | **Using exact values*** Find exact values for sin, cos, tan of standard angles (in radians (fractions of pi))
 | Using the correct notation for radian measure Fractions of π 0.3 radCheck solution(s) are in the correct range 0 - 2 π - π - πSwitching between rad / deg on calculator | * Using exact values to solve problems [Questions](https://drive.google.com/file/d/0B4bEjiUzbc3cN291Z3FOdXhHOE0/view?usp=sharing) / [Answers](https://drive.google.com/file/d/0B4bEjiUzbc3cZzBVWWlTekRXOG8/view?usp=sharing)
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| **3** | Using a table to show that x = Sin x for small values of x and showing graphically. [Table](https://drive.google.com/file/d/0B4bEjiUzbc3cTGZRcXFlZUZQZTg/view?usp=sharing) | * Proof of Sin (x) = x using isosceles triangle, sector, right angle triangle.[Guided Proof](file:///%5C%5Cfileserver2%5Cteachers%24%5Cc.kirkham%5CDocuments%5CA%20Level%5CAMSP%5CSmall%20Angle%20Theorems.pptx)
* Showing Cos x approximation graphically and deriving Tan x approximation
* Calculating [percentage error](https://drive.google.com/file/d/0B4bEjiUzbc3cbDJiYWN0b2I2QU0/view?usp=sharing) approximations for cos
 | Prove Cos small angle approx.. once double angle identities have been done.[How far is the Horizon (nrich)](https://2017.integralmaths.org/mod/url/view.php?id=4121)[Flight Path (nrich)](https://nrich.maths.org/5606) | [Problems using radians](https://drive.google.com/file/d/0B4bEjiUzbc3cT2V4Y2RGUnRfM0E/view?usp=sharing)[Solutions](https://drive.google.com/file/d/0B4bEjiUzbc3cRGtVeVBXM05yNDQ/view?usp=sharing) |