



Year 10 Foundation Scheme of Learning

MODULE 2



Bishop Chadwick
Catholic Education Trust



GCSE EXAMS

Bespoke revision

Perimeter, area & volume

Bounce back: Constructions & Loci

Quadratic equations

Compound measures

Percentages, including interest

Year 11

Indices & standard form

Bounce back: Quadratic equations

Constructions & Loci

Probability & diagrams

Perimeter, area & volume

Averages

Angles & Transformations

Straight line & other graphs

Expressions & equations

Pythagoras & Trigonometry

Year 10

Graphs

Fractions & percentages

Sequences

Pythagoras & Trigonometry

Ratio & proportion

Fractions & percentages

Data handling

Handling data & measures of location

Angles in parallel lines, lines & polygons

Fractions & percentages

Year 9

Algebra: substitution & brackets

Number; including index laws

Area of trapezia & circles; Line symmetry & reflections

Standard form & number sense

Indices, Sequences & Equations

Sets & probability

Proof

Multiplicative reasoning

Working in Cartesian plane

Brackets, equations & inequalities

Year 8

Ratio & proportion

Fraction arithmetic

Geometric reasoning

Prime numbers

Ratio & scale

Multiplying & dividing fractions

Representing data, tables & probability

Operations with directed numbers

Fraction & % of amounts

Fractions, decimals & percentages

Use and understand algebraic notation

Place value and ordering, including decimals

Year 7



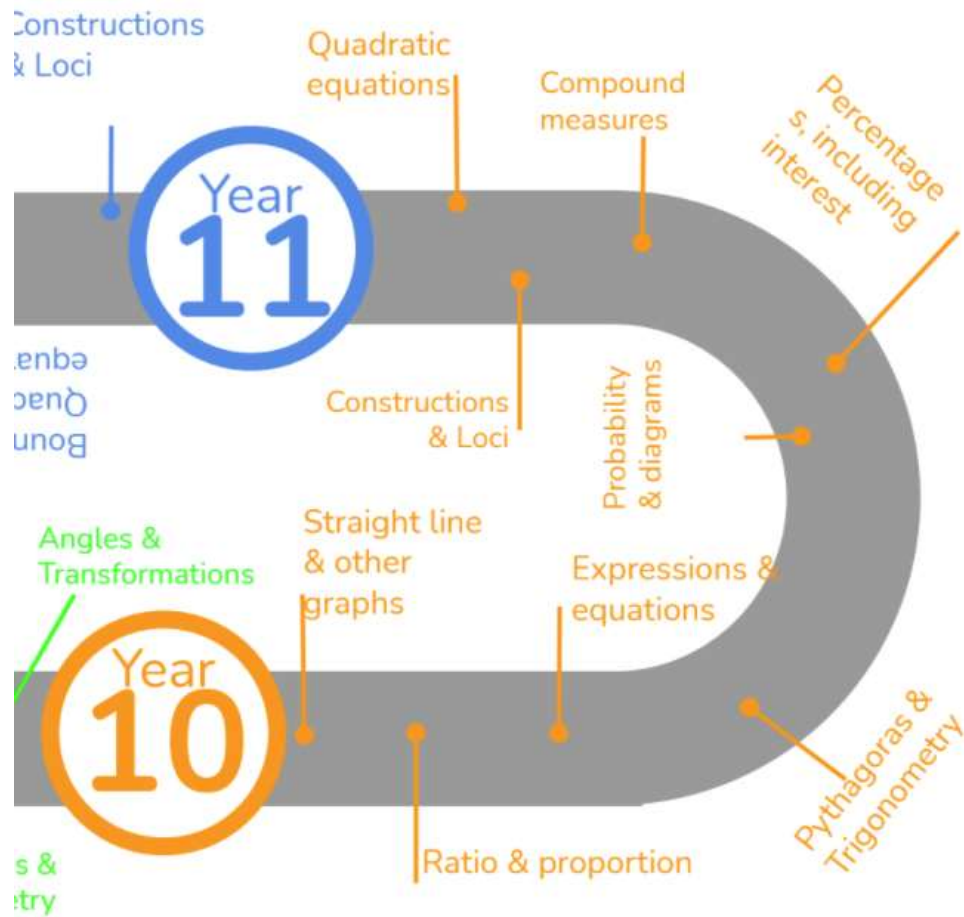
Problem solving with four main operations

Equality & Equivalence - solving equations

Sequences

Core/Foundation 2021/22 (includes Y11 bounce back)

This is what your child will be taught as part of the GCSE foundation course in Year 10 in their MATHS lessons.



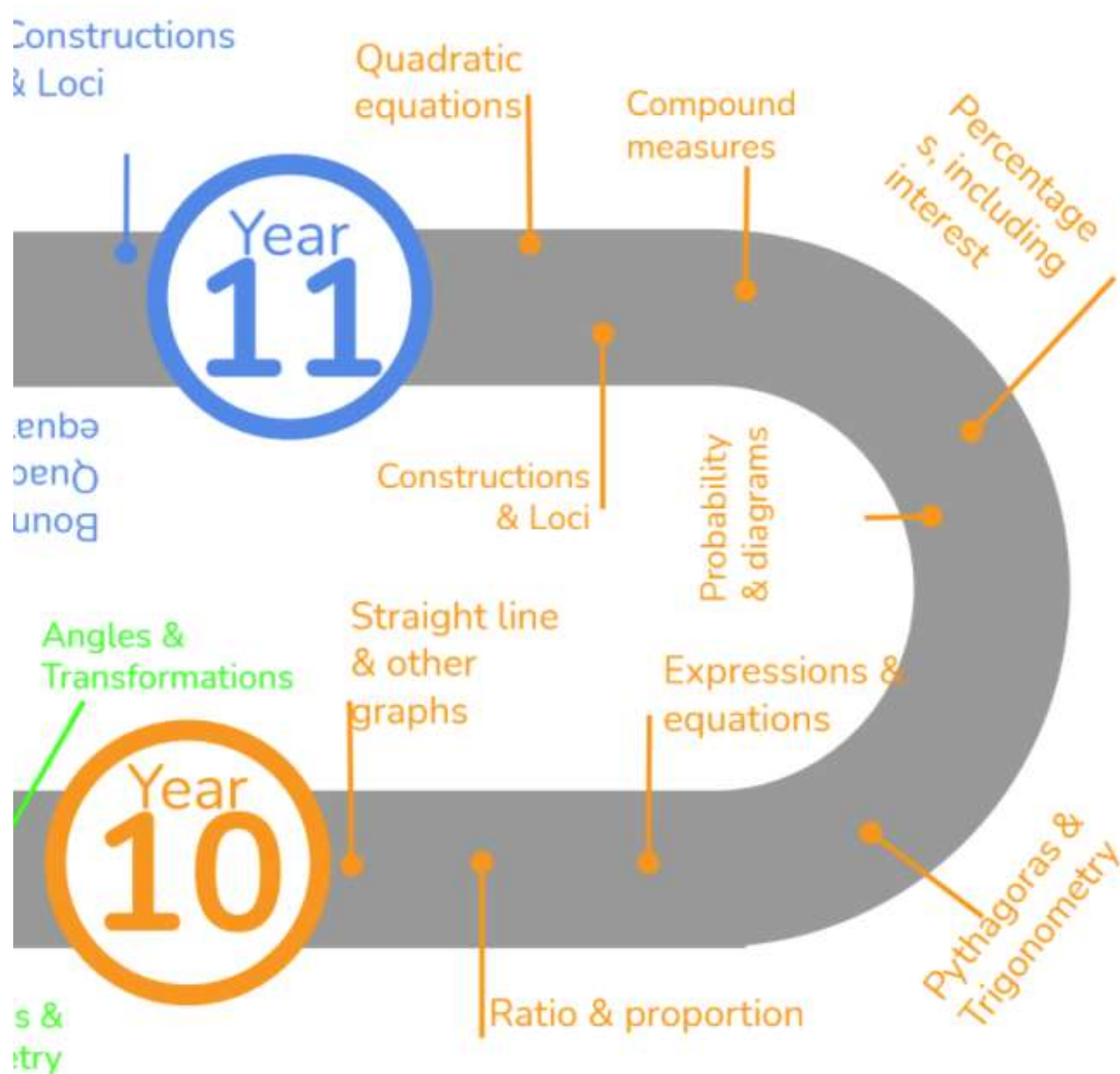
Cross Curricular Lessons



They will have also have specific lessons linked to other subjects and a diet of retrieval built into their lessons.

In Year 10 Module 2 your child will study the following topics:

- Pythagoras and Trigonometry
- Probability and Diagrams
- Percentages including Interest
- Compound Measures



Pythagoras and Trigonometry

Topics covered in this unit include:

- Finding the hypotenuse
- Finding the shorter side
- Understanding and using SOH CAH TOA
- Recognising when to use each method
- Introducing exact trigonometric values

Key angles

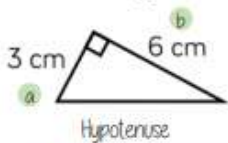
This side could be calculated using Pythagoras

Because trig ratios remain the same for similar shapes you can generalise from the following statements

$\tan 30 = \frac{1}{\sqrt{3}}$ $\cos 30 = \frac{\sqrt{3}}{2}$ $\sin 30 = \frac{1}{2}$
 $\tan 60 = \sqrt{3}$ $\cos 60 = \frac{1}{2}$ $\sin 60 = \frac{\sqrt{3}}{2}$

$\tan 45 = 1$ $\cos 45 = \frac{1}{\sqrt{2}}$ $\sin 45 = \frac{1}{\sqrt{2}}$

Calculate the hypotenuse



Either of the short sides can be labeled a or b

$$a^2 + b^2 = \text{hypotenuse}^2$$

1 Substitute in the values for a and b

$$3^2 + 6^2 = \text{hypotenuse}^2$$

$$9 + 36 = \text{hypotenuse}^2$$

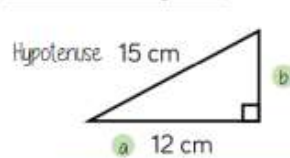
$$45 = \text{hypotenuse}^2$$

2 To find the hypotenuse square root the sum of the squares of the shorter sides

$$\sqrt{45} = \text{hypotenuse}$$

$$6.71\text{cm} = \text{hypotenuse}$$

Calculate missing sides



Either of the short sides can be labeled a or b

$$a^2 + b^2 = \text{hypotenuse}^2$$

$$12^2 + b^2 = 15^2$$

1 Substitute in the values you are given

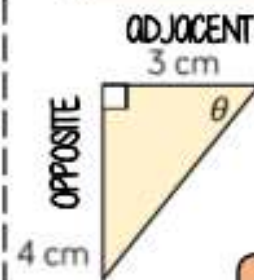
$$144 + b^2 = 225$$

Rearrange the equation by subtracting the shorter square from the hypotenuse squared

$$\text{Square root to find the length of the side} \begin{cases} b^2 = 111 \\ b = \sqrt{111} = 10.54 \text{ cm} \end{cases}$$

Sin, Cos, Tan: Angles

Inverse trigonometric functions



Label your triangle and choose your trigonometric ratio

Substitute values into the ratio formula

$$\theta = \tan^{-1} \frac{\text{opposite side}}{\text{adjacent side}}$$

$$\theta = \sin^{-1} \frac{\text{opposite side}}{\text{hypotenuse side}}$$

$$\theta = \cos^{-1} \frac{\text{adjacent side}}{\text{hypotenuse side}}$$

$$\tan \theta = \frac{4}{3}$$

$$\theta = \tan^{-1} \frac{4}{3}$$

$$\theta = 36.9^\circ$$

Keywords

Enlarge: to make a shape bigger (or smaller) by a given multiplier (scale factor)

Scale Factor: the multiplier of enlargement

Constant: a value that remains the same

Cosine ratio: the ratio of the length of the adjacent side to that of the hypotenuse. The sine of the complement

Sine ratio: the ratio of the length of the opposite side to that of the hypotenuse

Tangent ratio: the ratio of the length of the opposite side to that of the adjacent side

Inverse: function that has the opposite effect

Hypotenuse: longest side of a right-angled triangle. It is the side opposite the right-angle



In this unit your child will study:

- Basic probability and the probability scale
- Experimental probability
- Sample space diagrams
- Frequency trees
- Venn diagrams
- Probability trees



Probability and Diagrams

Likelihood of a probability

Impossible 0 or 0% Even chance 0.5, $\frac{1}{2}$ or 50% Certain 1 or 100%

The more likely an event the further up the probability it will be in comparison to another event. (It will have a probability closer to 1)

Sum to 1

Probability is always a value between 0 and 1

The probability of getting a blue ball is $\frac{1}{5}$
 \therefore The probability of **NOT** getting a blue ball is $\frac{4}{5}$

The sum of the probabilities is 1

Tables, Venn diagrams, Frequency trees

Frequency trees:
 60 people visited the zoo one Saturday morning. 26 of them were adults. 13 of the adult's favourite animal was an elephant. 24 of the children's favourite animal was an elephant.

Two-way table:

	Elephant	Other	Total
Adult	13	13	26
Child	24	10	34
Total	37	23	60

Venn diagram:

Frequency trees and two-way tables can show the same information.
 The total columns on two-way tables show the possible combinations.
 $P(\text{Adult}) = \frac{26}{60}$
 $P(\text{Child with favourite animal as elephant}) = \frac{24}{60}$

Sample space

The possible outcomes from rolling a dice

	1	2	3	4	5	6
H	1H	2H	3H	4H	5H	6H
T	1T	2T	3T	4T	5T	6T

$P(\text{Even number and tails}) = \frac{3}{12}$

Keywords

- Event:** one or more outcomes from an experiment
- Outcome:** the result of an experiment
- Intersection:** elements (parts) that are common to both sets
- Union:** the combination of elements in two sets
- Expected Value:** the value/ outcome that a prediction would suggest you will get
- Universal Set:** the set that has all the elements
- Systematic:** ordering values or outcomes with a strategy and sequence
- Product:** the answer when two or more values are multiplied together.

Percentages including Interest

Topics covered in this unit include:

- Calculating percentages
- Calculating percentage increase and decrease
- Percentage change
- Reverse percentages
- Simple and Compound Interest

Fraction/ Percentage of amount R

Find $\frac{3}{5}$ of £60

Remember $\frac{3}{5} = 60\%$

10% of £60 = £6
50% of £60 = £30
60% of £60 = £36

Remember $\frac{3}{5} = 60\% = 0.6$
60% of £60 = $0.6 \times 60 = £36$

Percentage increase: Multipliers

Increase by 12%

$100\% + 12\% = 112\%$ ← Multiplier
 $100 + 0.12 = 1.12$ ← More than 1

Percentage decrease: Multipliers

Decrease by 58%

$100\% - 58\% = 42\%$ ← Multiplier
 $100 - 0.58 = 0.42$ ← Less than 1

Percentage change

I bought a phone for £200
A year later sold it for £125

All values of change compare to the ORIGINAL value

Percentage loss
 $\frac{75}{200} \times 100 = 37.5\%$

I bought a house for £180,000, I later sold it for £216,000

Percentage profit
 $\frac{36000}{180000} \times 100 = 20\%$

Money made (profit value)

$\frac{\text{Difference in value}}{\text{Original value}} \times 100$

Find the original value

Percentage calculations

Original amount \times Multiplier = Final Value

In a test Lucy scored 60% of her questions correctly. Her score was 24. How many questions were on the test?

Original $\times 0.6 = 24$

$24 \div 0.6 = 40$ marks

10% = 6
100% = 40

Total questions on test

A car sold for a profit £3000 with a profit of 20%. How much was the car originally?

Original $\times 1.2 = 3000$

120% = £3000
10% = £250
100% = £2500

Simple and compound interest

Simple interest

James invests £2000 at 5% simple interest.

The original value increases by this amount every year

Compound interest

Tess invests £100 at 10% compound interest for 3 years

The multiplier 1.10 repeats each year

Repeated percentage change

Compound interest

Tess invests £100 at 10% compound interest for 3 years

Original amount, Repeated multiplier, Number of occurrences

Depreciation

Depreciation calculations use multipliers less than 1

Multipliers are cumulative – an overall multiplier effect can be calculated by combining the multipliers separately

eg Increase of 10% then a reduction of 10%

$\times 1.10$ $\times 0.9$
 $\times 0.99$ The multiplier

Keywords

Percent: parts per 100 – written using the % symbol

Decimal: a number in our base 10 number system. Numbers to the right of the decimal place are called decimals.

Fraction: a fraction represents how many parts of a whole value you have.

Equivalent: of equal value.

Reduce: to make smaller in value.

Growth: to increase/ to grow.

Integer: whole number, can be positive, negative or zero.

Invest: use money with the goal of it increasing in value over time (usually in a bank).



Compound Measures



In this unit your child will study:

- Speed, distance, time
- Density, mass, volume
- Force, pressure, area

This is a cross-curricular topic with links to Science

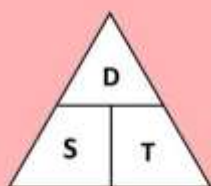
MATHS

Cross
Curricular
Links

C I E N C E



Distance Speed Time

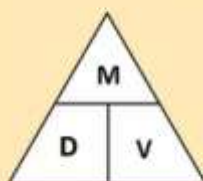


$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

$$\text{Distance} = \text{Speed} \times \text{Time}$$

$$\text{Time} = \frac{\text{Distance}}{\text{Speed}}$$

Mass Density Volume



$$\text{Volume} = \frac{\text{Mass}}{\text{Density}}$$

$$\text{Density} = \frac{\text{Mass}}{\text{Volume}}$$

$$\text{Mass} = \text{Density} \times \text{Volume}$$

Compound Measurement: A measure made up of two or more measurements (e.g. speed, pressure, density)

Force Area Pressure



$$\text{Pressure} = \frac{\text{Force}}{\text{Area}}$$

$$\text{Area} = \frac{\text{Force}}{\text{Pressure}}$$

$$\text{Force} = \text{Area} \times \text{Pressure}$$

We recommend pupils have a Casio scientific calculator.

The Casio calculator featured is the one we use when demonstrating in lessons.



On our school website there is a calculation policy showing the methods we use for common operations.

**It can be found at:
Our School > Policies**



St Joseph's Catholic Academy

Calculation Policy