

## Y10 Unit 3 Overview-Transformations, Graphs, FDP and Vectors

Test Date:

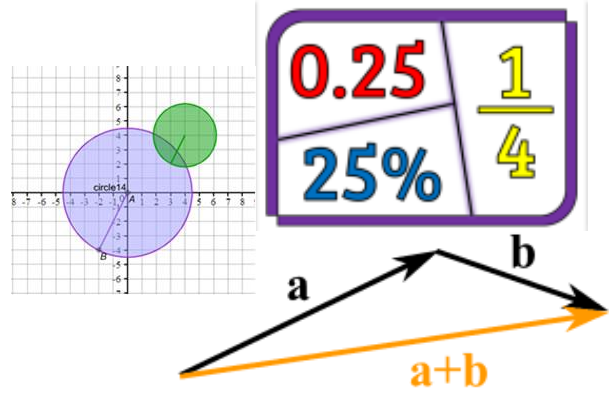
Target grade for tests:

You will learn about:

- Transformations
- Exponential graphs and graphs of circles
- Rates of change
- Recurring decimals
- Vectors

You will be able to:

- Identify, describe and construct similar shapes by considering enlargement (including fractional scale factors).
- Make links *between* similarity and scale factors.
- Describe the changes and invariance achieved by combinations of rotations, reflections and translations.
- Plot and interpret graphs (including exponential graphs) and graphs of non-standard functions in real contexts, to find approximate solutions to problems such as simple kinematic problems involving distance, speed and acceleration.
- Calculate or estimate gradients of graphs and areas under graphs and interpret results in cases such as distance-time graphs, velocity-time graphs and graphs in financial contexts.
- Interpret the gradient at a point on a curve as the instantaneous rate of change.
- Identify and interpret roots, intercepts, turning points of quadratic functions graphically.
- Use the form  $y = mx + c$  to identify perpendicular lines.
- Recognise and use the equation of a circle with centre at the origin.
- Find the equation of a tangent to a circle at a given point.
- Change recurring decimals into their corresponding fractions and vice versa.
- Set up, solve and interpret the answers in growth and decay problems, including compound interest.
- Work with vectors.



### Lesson Overview

#### TRANSFORMATIONS

- Use the centre and scale factor to carry out an enlargement of a 2D shape with a fractional scale factor
- Find the scale factor of an enlargement with fractional scale factor
- Find the centre of an enlargement with fractional scale factor
- Make links between similarity and scale factors
- Solve problems involving similarity
- Perform a sequence of transformations on a 2D shape
- Find and describe a single transformation given two congruent 2D shapes

#### GRAPHS

- Recognise (plot, interpret) graphs of exponential functions
- Plot graphs of non-standard functions
- Use graphs of non-standard functions to solve simple kinematic problems
- Recognise that the gradient of a curve is not constant
- Know that the gradient of a curve is the gradient of the tangent at that point
- Calculate (estimate) the gradient at a point on a curve
- Interpret the gradient at a point on a curve as the instantaneous rate of change
- Solve problems involving the gradients of graphs in context
- Know that the area under a speed-time graph gives the distance
- Calculate (estimate) the area under a graph
- Solve problems involving the area under graphs in context

### Key Words

Refer to

<http://studymaths.co.uk/glossary.php>  
for definitions of the key words

Perpendicular bisector

Scale Factor

Similar

Congruent

Invariance

Transformation

Rotation

Reflection

Translation

Enlargement

Function, equation

Linear, non-linear

Quadratic, cubic, reciprocal, exponential

Parabola, Asymptote

Gradient, y-intercept, x-intercept, root

Rate of change

Sketch, plot

Kinematic

Speed, distance, time

Acceleration, deceleration

- Identify (interpret) roots, intercepts and turning points of quadratic functions graphically
- Know that perpendicular lines have gradients with a product of -1
- Identify perpendicular lines using algebraic methods
- Know the equation of a circle with centre at the origin
- Identify the equation of a circle from its graph
- Use the equation of a circle to draw its graph
- Find the equation of a tangent to circle at a given point
- Solve algebraic problems involving tangents to a circle

#### EXPLORING FRACTIONS, DECIMALS AND PERCENTAGES

- Understand and use notation for recurring decimals
- Interpret a calculator display involving a recurring decimal
- Convert a fraction to a recurring decimal
- Recall the recurring decimal equivalents of ninths
- Set up an equation which can be used to convert a recurring decimal to a fraction
- Convert a recurring decimal of the form  $0.\dot{x}$ ,  $0.\dot{x}y$ ,  $0.\dot{x}yz$  to a fraction
- Convert a recurring decimal of the form  $0.0\dot{x}$ ,  $0.0\dot{x}y$ , to a fraction
- Recognise when a situation involves compound interest
- Set up a compound interest problem
- Calculate the result of a repeated percentage change, including compound interest
- Set up a growth or decay problem
- Solve problems involving growth and decay

#### VECTORS

- Understand the concept of a vector
- Use diagrammatic representation of vectors
- Know and use different notations for vectors
- Add (subtract) vectors
- Multiply a vector by a scalar
- Solve simple geometrical problems involving vectors

Parallel  
Perpendicular  
Centre (of a circle)  
Radius  
Tangent

**Notation**  
 $y = mx + c$

Fraction  
Mixed number  
Top-heavy fraction  
Percentage change, percentage increase, percentage increase  
Compound interest, Simple interest  
Terminating decimal, Recurring decimal  
(Exponential) growth, decay

**Notation**  
Dot notation for recurring decimals; e.g.  $0.\dot{x}yz = 0.xyzxyzxyz \dots$  and  $0.x\dot{y} = 0.xyyy \dots$   
Note that other notations for recurring decimals are used, for example the vinculum,  $0.\dot{x}yz = 0.\overline{xyz}$  (USA); parentheses,  $0.\dot{x}yz = 0.(xyz)$  (parts of Europe); the letter 'R',  $0.x^R$  (upper or lower case)

Vector  
Scalar  
Constant  
Magnitude

**Notation**  
 $\underline{a}$  (print) and  $\underline{a}$  (written) notation for vectors  
 $\overline{AB}$  notation for vectors  
Column vector notation  $\begin{pmatrix} p \\ q \end{pmatrix}$ ,  $p$  = movement right and  $q$  = movement up

#### **Suggested reading or support/ challenge available**

Support is available from a Maths teacher in 'MORALE' in M1 daily from 1:30pm -1:45pm

#### **Pixl Maths App**

login: PY2415  
username: surname followed by first initial  
password: first name

#### [www.hegartymaths.com](http://www.hegartymaths.com)

Go to student login at the top... find your school, enter your details and then set up your password...

#### **Use your revision guide**

Use the code in the front of your guide to access your free online revision

#### **Cross curricular**

##### SMSC:

- 1.1 Exploring, understanding and respecting cultural diversity e.g. exploration of different methods of calculation.
- 3.1 Developing personal qualities and using social skills (regular paired/ group work communication).
- 3.2 Participating, cooperating and resolving conflicts (paired/group activities).
- 4.2 Experiencing fascination, awe and wonder of mathematics.
- 4.4 Using imagination and creativity in learning.

##### Literacy:

Verbal communication of understanding using key words in the correct context. Development of written communication of methods and strategies to problem solve.

##### NAC:

**Science** – Solve problems using intersections or gradients of graphs. Understand and use fraction, decimal and percentage equivalence. Calculate percentages of quantities. Calculate a number as a percentage of another.

**RE** - Calculate percentages of quantities.

[www.corbettmaths.com](http://www.corbettmaths.com)

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questions on specific  
topics and the "5-a-day"

[vle.mathswatch.com/vle/](http://vle.mathswatch.com/vle/)

login: school username followed by  
**@penryn-college**  
password: **Penryn2016**

[www.justmaths.co.uk/online](http://www.justmaths.co.uk/online)

login: PenrynStudent  
password: Penryn

**Business** – Calculate percentages of quantities. Calculate a number as a percentage of another.  
**Geography** – Understand and use fraction, decimal and percentage equivalence.  
**Technology** – Calculate percentages of quantities.

Research	Note-making	Group work & discussion	Memorisation	Precision & accuracy	Independence	Reflection