## Checkpoint Maths Scheme of Work

## Year 3

## Unit 9: Shape, Space and Measures

## Key Learning Outcomes

Pupils should be able to:

- use and interpret bearings
- draw the locus of a point that moves in two dimensions according to simple rules
- use measures of speed and other compound measures to solve problems
- use the formula for the volume of a sphere
- understand and apply pythagoras' theorem
- use sine, cosine and tangent ratios in right-angled triangles to solve problems in two dimensions


## Links

The Checkpoint curriculum references are given in the Learning outcomes column.
IGCSE Syllabus Topics 10, 26, 30, 31, 32.
Chapter references in Checkpoint Maths 11-14 (Book 3) by Ric Pimental and Terry Wall are given in the Resources column.

## Vocabulary

The vocabulary listed for Units 3 and 7 is assumed in addition to the words listed below.
Adjacent, average speed, bearing, chord, circumference, cosine, cross-section, diameter, hypotenuse, locus, metres per second, opposite, pi ( $\pi$ ), Pythagoras' theorem, radius, region, sector, segment, sine, sphere, tangent.

| Learning Outcomes |  | Suggested Teaching Activities | Resources |
| :---: | :---: | :---: | :---: |
| Sg1 | Use and interpret bearings | Identify places on maps according to their bearings and distances from a given place, or according to their bearings from two different places. Plot a course for a ship steering between islands. <br> Make a map of a desert island with instructions for finding the buried treasure. Find the treasure by drawing and measuring. | Ideas from: <br> http://www.sailingissues.com/navcourse4.html <br> Checkpoint Maths 11-14 (Book 3) Chapter 4 |
| Sg5 | Find the locus of a point that moves according to given rules. | Explain that the locus of a point is all the positions that the point can be in whilst still obeying the given rule. Start by identifying a few positions that obey a rule and progress until the locus can be predicted (either a line or an area). Describe the line or area in words and lead on to the recognised definitions. <br> Practise accurate drawings of loci. | www.mathsnet.net/dynamic/cindy <br> Checkpoint Maths 11-14 (Book 3) Chapter 14 |
| Sm4 | Understand and use measures of speed (and other compound measures such as density or pressure) to solve problems. <br> Solve problems involving constant or average rates of change. | Demonstrate that units such as kph actually mean the distance in kilometres travelled in one hour. Show that if you take the 'per' to mean divide the units provide a useful hint about calculating the speed and what units of length and time to use. <br> Calculate speeds using different units of length and time, and then naming the unit of speed. Continue this idea with other compound units. <br> Discuss average speed for a journey. Use different journeys involving stopping and starting to highlight the concept. <br> Solve problems and calculate average speeds in a variety of units. | Checkpoint Maths 11-14 (Book 3) Chapter 2 |


| Learning Outcomes | Suggested Teaching Activities | Resources |  |
| :--- | :--- | :--- | :--- |
| Sm5 | Understand and apply the formula for <br> the volume of a sphere in a variety of <br> contexts. | Revise formulae to calculate the volume of <br> prisms. <br> Extend work to include the volume of a sphere. <br> Ask pupils to estimate the volume of different <br> spheres, e.g. a football, a tennis ball, etc. | Checkpoint Maths 11-14 (Book 3) Chapter 18 |
| St1 | Understand and apply Pythagoras' <br> theorem. | Revise squares and square roots. <br> Before using a formula for Pythagoras' theorem <br> draw right-angled triangles, construct the squares <br> on each side and deduce the relationship <br> between the areas of these squares. Ensure that <br> all students recognise the term hypotenuse and <br> understand that it always refers to a side <br> opposite a right angle in a triangle. | Checkpoint Maths 11-14 (Book 3) Chapter 3 |
| Solve problems involving Pythagoras' theorem. | Checkpoint Maths 11-14 (Book 3) Chapter 19 <br> Encourage the use of a diagram and the question |  |  |
| 'Do I need to find the longest side (and hence the |  |  |  |
| square with the largest area) or one of the shorter |  |  |  |
| sides?' |  |  |  |
| Experiment with non-right angled triangles and |  |  |  |
| discover that Pythagoras' theorem is no longer |  |  |  |
| true. |  |  |  |$\quad$| St2 |
| :--- |


| Learning Outcomes | Suggested Teaching Activities | Resources |
| :---: | :---: | :---: |
|  | Observe that the ratios are relatively constant for the same angle, whatever the lengths of the sides. Use the table to predict the answers to problems. <br> Solve problems using a calculator. Give sufficient graded examples on worksheets to ensure that the students are confident using all three ratios. Finish with mixed examples. | Checkpoint Maths 11-14 (Book 3) Chapter 19 |

