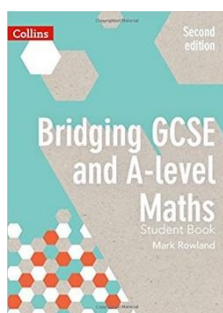


A Level Maths: Summer Task



Introduction

There are a number of GCSE topics which will be relied upon during your early study of the A Level Maths course. Section A of this Summer Task gives you an opportunity to practise some of these key skills and develop your understanding of any areas which you find challenging.



Bridging Textbook

It is highly recommended that you purchase a copy of a GCSE to A Level bridging textbook such as “**Bridging GCSE and A-level Maths**” (Collins ISBN: 978-0008205010). This book provides detailed notes on each of these topics, full examples, questions, hints, common errors and full solutions.

Wider skills

There are three overarching themes to Maths A Level:

- **Mathematical argument, language and proof**
- **Mathematical problem solving**
- **Mathematical modelling**

These skills are often assessed in examinations through your correct and efficient use of symbols, precise statements and explanations, rigorous proofs and an ability to pick out the underlying mathematical structure in a situation in order to solve a problem. Marks are awarded for your method and communication of your thinking: a final correct answer will usually only achieve part marks.

Section B of this Summer Task gives you an opportunity to demonstrate your starting point in developing these skills by solving a problem and presenting your solution in a mathematically concise way which is easy for anyone to read and follow.

Section A: Topic Questions

Instructions

Answer each of the questions below on lined paper. Show your method for each question and underline your final answer.

While calculators are permitted in all A Level examinations, the majority of the questions below should be attempted without a calculator as developing the speed and accuracy of your mental calculations will benefit you greatly in the time pressure of examinations.

1 Numbers and indices

1a Evaluate:

$$\frac{1}{4} \div \frac{7}{8} + \frac{4}{9}$$

1b Simplify fully: $\sqrt{45} + \sqrt{180}$

1c Simplify fully: $(y^2)^3 \div y^4$

2 Algebra 1

2a Simplify as far as possible: $\frac{8x^6}{6x^8}$

2b Write as a single fraction in its simplest form: $\frac{2m}{n} - \frac{5m}{3n}$

2c Solve the equation: $\frac{4x}{5} - 3 = -21$

2d Solve the equation: $(x + 7) - 2(3 - 2x) = 16$

2e An isosceles triangle has two angles of x° . Find the size of the third angle in terms of x .

3 Coordinate geometry 1

3a Make a sketch of the two straight-line graphs:
 $y = 3 - 2x$ and $x + y = -1$

3b Find the gradient and the y -intercept of the line $2x + y = 4$.

- 3c Find the point exactly halfway between $(-2,5)$ and $(3,7)$.
- 3d Find the length of the line segment connecting $(-2,5)$ and $(3,7)$.
- 3e Write down the equation of a line parallel to $y = \frac{3}{2}x$.

4 Algebra 2

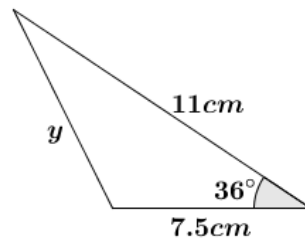
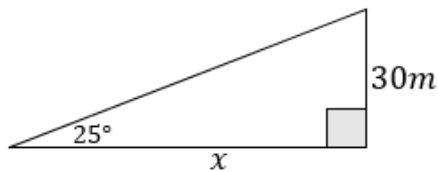
- 4a Solve the following equation: $x^2 - 5x - 24 = 0$
- 4b *[calculator permitted]* Solve the equation: $3x^2 = x + 5$

5 Coordinate geometry 2

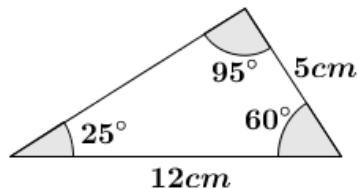
- 5a What transformation changes the curve $y = 3x^2$ into $y = 3x^2 + 5$?
- 5b Sketch the curve $y = x^2 - 9$, showing clearly where it crosses the coordinate axes.

6 Trigonometry and triangles

- 6a *[calculator permitted]* Find the length of sides x and y in the triangles below:



- 6b *[calculator permitted]* Find the area of the triangle below:



Section B: Problem Solving and Communication

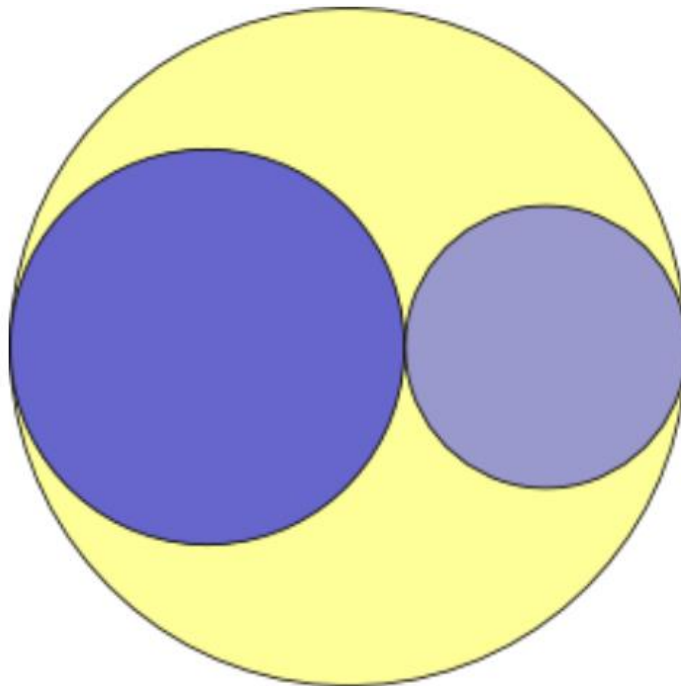
Instructions

Your task is to solve the problem below, using the knowledge and skills you have developed at GCSE.

You will need to decide how to approach the problem and you may need to try various approaches before you hit upon a final answer.

When you think you have solved the problem, you will need to present your solution in a neat (hand-written) and logical way. Correct use of symbols and notation is expected. You should expect to use at least one side of A4 to fully explain your thinking and methods.

Problem



The diagram above consists of three circles. The two smaller circles fit perfectly within the larger circle.

If the area shaded yellow is equal to the area of the larger of the two blue circles, what is the ratio of the radii of the three circles?