

Year 12 AS/A level Further Maths Baseline Test

Instructions

- The time for the test is 1 hour.
- Answer **all** questions.

Information

- The total mark for this paper is 48.
- The marks for each question are shown in brackets
-use this as a guide as to how much time to spend on each question.

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

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1 Simplify these expressions as far as possible.

a $\frac{x^2 - 3x - 10}{x^2 + 4x + 4}$ (3 marks)

b $\frac{x^2 - 36}{x^2 + x - 12} \div \frac{x^2 - 4x - 12}{x^2 - 9}$ (4 marks)

2 The line l is a tangent to the circle $x^2 + y^2 = 13$ at the point $P(3, 2)$.

The tangent intersects the y -axis at point A . Find the area of the triangle OPA . (5 marks)

3 Expand and simplify $(2\sqrt{p} - 3\sqrt{q})(2\sqrt{p} + \sqrt{q})$ (3 marks)

4 a Write $3x^2 - 9x + 5$ in the form $a(x + b)^2 + c$ (3 marks)

b Hence, or otherwise, write down the coordinates of the turning point of the graph of $y = 3x^2 - 9x + 5$. (1 mark)

5 Prove algebraically that the sum of the squares of two consecutive **odd** integers is always an even number. (4 marks)

6 The functions g and f are defined as $g(x) = \frac{3x}{3+x}$ and $f(x) = 2x - 5$

Given that $x \neq -3$, find the value(s) of x such that $g(x) = f(x)$, giving your answer(s) to 2 decimal places. (6 marks)

7 The line l_1 has equation $y = -\frac{1}{4}x + 5$ and intersects the x - and y -axes at points A and B respectively.

a Find the exact length of the line segment AB . (3 marks)

b Find the equation of the line l_2 perpendicular to l_1 which passes through the point $P(1, -3)$.

The line l_2 intersects l_1 at the point C . (2 marks)

c Find the midpoint of the line segment AC . (4 marks)

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- 8** A triangle ABC has side lengths $AB = 12$ cm, $BC = 7$ cm and $AC = 9$ cm.
- a** Find the size of the largest angle, giving your answer to 2 decimal places. **(3 marks)**
- b** Find the area of the triangle, giving your answer to 2 decimal places. **(2 marks)**
- 9 a** Sketch the graph of $y = \sin x$ for $0 \leq x \leq 540^\circ$, showing the points where the graph cuts the axes. **(2 marks)**
- b** Hence find the exact values of x in the interval $0 \leq x \leq 540^\circ$ for which
- $$\sin x = \frac{1}{\sqrt{2}} \quad \textbf{(3 marks)}$$

This is the end of the test.