

Maths Entry Assessment

Name Date Score

Time: about 75 minutes. Hampstead Tuition Centre - Year 11 Maths Entry Assessment (GCSE Higher). You have 75 minutes. Show full working throughout - method marks are awarded. Calculators are NOT allowed unless a question states otherwise. Give exact answers (surds and pi) where asked, write 'root 50' style surds and use ^ for powers. The last few questions reach grade 8/9 standard; attempt everything you can. Show your working where you can. Marks for each question are shown in brackets, like [2]. Total marks: **52**.

- 1 Work out $2\frac{1}{3}$ divided by $1\frac{5}{9}$, giving your answer as a mixed number in its simplest form. [2]

WORKING

Answer

FRACTIONS

- 2 Write $(\sqrt{5} + \sqrt{2})(\sqrt{5} - \sqrt{2})$ as a single integer. [2]

WORKING

Answer

SURDS

- 3 Solve $3x^2 - 11x - 4 = 0$ by factorising. [3]

WORKING

Answer

QUADRATICS

- 4 Rationalise the denominator and simplify: $6 / \sqrt{3}$. [2]

WORKING

Answer

SURDS (RATIONALISING)

5 Express $4x^2 - 24x + 11$ in the form $a(x - b)^2 + c$.

[3]

WORKING

Answer _____

COMPLETING THE SQUARE

6 y is inversely proportional to the square of x . When $x = 2$, $y = 9$. Find y when $x = 6$.

[3]

WORKING

Answer _____

PROPORTION

7 $f(x) = 3x - 2$ and $g(x) = x^2 + 1$. Work out (a) $fg(2)$, and (b) the inverse function $f^{-1}(x)$.

[4]

WORKING

Answer _____

FUNCTIONS

8 Solve the equation $x^2 - 6x + 2 = 0$, giving your answers in the form $a \pm \sqrt{b}$ where a and b are integers.

[3]

WORKING

Answer _____

QUADRATIC FORMULA WITH SURDS

- 9 Solve the simultaneous equations $y = x^2 - 3x + 4$ and $y = 2x + 4$.

[4]

WORKING

Answer

LINEAR/QUADRATIC SIMULTANEOUS

- 10 A and B are points on a circle, centre O. The chord AB has length 16 cm and the radius of the circle is 10 cm. Calculate the shortest (perpendicular) distance from O to the chord AB.

[3]

WORKING

Answer

CIRCLE GEOMETRY / PYTHAGORAS

- 11 Add the algebraic fractions: $\frac{2}{x+1} + \frac{3}{x-2}$, writing your answer as a single fraction.

[3]

WORKING

Answer

ALGEBRAIC FRACTIONS

- 12 In triangle ABC, $AB = 7$ cm, $AC = 9$ cm and angle $BAC = 58$ degrees. Using the cosine rule, calculate the length of BC to 2 significant figures. (You may use $\cos 58 = 0.5299$.)

[4]

WORKING

Answer

COSINE RULE (TRIGONOMETRY)

- 13 Prove that the sum of the squares of any two consecutive odd numbers is even but not a multiple of 4. (Take the odd numbers as $2n + 1$ and $2n + 3$.) [4]

WORKING

Answer _____

ALGEBRAIC PROOF (STRETCH)

- 14 The diagram shows a sector of a circle of radius 12 cm with sector angle 150 degrees. A second, smaller sector of radius 4 cm and the same 150-degree angle is removed from its centre, leaving a 'ring' sector. Find the exact area of the remaining shape, giving your answer as a multiple of π . [4]

WORKING

Answer _____

AREA OF SECTORS (STRETCH)

- 15 Solve the equation $\frac{2}{x - 1} - \frac{1}{x + 2} = 1$, giving your answers in exact form. [4]

WORKING

Answer _____

EQUATIONS WITH ALGEBRAIC FRACTIONS (STRETCH)

16

A curve has equation $y = x^2 - 4x + 7$. (a) Show by completing the square that the curve has a minimum point, and state its coordinates. (b) Explain why the equation $x^2 - 4x + 7 = 0$ has no real solutions.

[4]

WORKING

Answer

COMPLETING THE SQUARE / ROOTS (STRETCH)

End of assessment. Hand your paper back when you are finished. Well done!