

Oxford

1. Mathematics

Toss Up: Short Answer

In a 2 by 2 matrix with first row a, b and second row c, d, what is the name commonly associated with the value $ad - bc$?

Toss Up Answer: Determinant

Bonus: Multiple Choice

What is the closest distance from the point (6, 8) to the line, $3x + 2y - 1 = 0$?

- W) 2.3
- X) 3.3
- Y) 4.3
- Z) 5.3

Bonus Answer: X

2. Mathematics

Toss Up: Multiple Choice

A complex number multiplied by its complex conjugate is equivalent to which of the following?

- W) The argument
- X) The argument squared
- Y) The magnitude
- Z) The magnitude squared

Toss Up Answer: Z

Bonus: Short Answer

The Hardy-Ramanujan is given as the smallest positive integer that can be expressed as the sum of two different pairs of perfect positive cubes. What is the Hardy-Ramanujan number?

Bonus Answer: 1729

3. Mathematics

Toss Up: Multiple Choice

Given the polynomial, $24 - 50x + 35x^2 - 10x^3 + x^4$, which of the following is not a possible root by the rational root theorem?

- W) 2
- X) 3
- Y) 4
- Z) 5

Toss Up Answer: Z

Bonus: Short Answer

How many cubic polynomials, $f(x)$ with positive integral coefficients have $f(1) = 6$?

Bonus Answer: 84 (equivalent to 9C3 by stars and bars)

4. Energy

Toss Up: Multiple Choice

To the nearest thousand megawatts, how much geothermal energy does the US have installed?

- W) 1000
- X) 2000
- Y) 3000

Z) 4000

Toss Up Answer: Y

Bonus: Multiple Choice

Which country produces the second most geothermal electricity?

W) The US

X) The Phillipeans

Y) China

Z) Russia

Bonus Answer: X

5. Energy

Toss Up: Short Answer

Which DOE national lab conducted the Manhattan project?

Toss Up Answer: Oak Ridge (Accept: Oak Ridge National Lab)

Bonus: Short Answer

During the Manhattan project, which two atomic bombs were created?

Bonus Answer: Thin man and Fat man

6. Energy

Toss Up: Short Answer

Which branch of the National Energy Technology Laboratory was started the earliest?

Toss Up Answer: Pittsburg

Bonus: Multiple Choice

Which DOE national lab was started the earliest?

W) Lawrence Berkley National Lab

X) Thomas Jefferson National Accelerator Facility

Y) Fermi National Lab

Z) SLAC National Lab

Bonus Answer: W
