Core 2 Indices Questions
(From the Oxford MAT Tests)

For answers, see the MAT website

2007, Question 1a:

A. Let r and s be integers. Then

$$\frac{6^{r+s} \times 12^{r-s}}{8^r \times 9^{r+2s}}$$

is an integer if

(a) $r + s \leqslant 0$,
(b) $s \leqslant 0$,
(c) $r \leqslant 0$,
(d) $r \geqslant s$.

2007, Question 1e:

E. If x and n are integers then

$$(1-x)^n (2-x)^{2n} (3-x)^{3n} (4-x)^{4n} (5-x)^{5n}$$

is

(a) negative when $n > 5$ and $x < 5$,
(b) negative when n is odd and $x > 5$,
(c) negative when n is a multiple of 3 and $x > 5$,
(d) negative when n is even and $x < 5$.

2010, Question 1j:

J. Let a, b, c be positive numbers. There are *finitely* many *positive whole* numbers x, y which satisfy the inequality

$$a^x > c\, b^y$$

if

(a) $a > 1$ or $b < 1$.
(b) $a < 1$ or $b < 1$.
(c) $a < 1$ and $b < 1$.
(d) $a < 1$ and $b > 1$.

2012, Question 1b:

B. Let $N = 2^k \times 4^m \times 8^n$ where k, m, n are positive whole numbers. Then N will definitely be a square number whenever

(a) k is even;
(b) $k + n$ is odd;
(c) k is odd but $m + n$ is even;
(d) $k + n$ is even.
