## Factoring 3 <br> NO CALCULATORS <br> Short Answer Questions 17-28 are worth DOUBLE

1. Express $8^{x} \cdot 2^{1-3 x}$ in simplest form.
A. 2
B. $2^{6 x-1}$
C. $2^{3 x-9 x^{2}}$
D. $16^{x-3 x^{2}}$
E. NOTA
2. If $\frac{1}{3 x}+\frac{2}{5 x}=11$ then $\frac{1}{x}=$
A. 15
B. 3
C. $\frac{1}{3}$
D. $\frac{1}{15}$
E. NOTA
3. Simplify $2^{n+1} \cdot 2^{n-3} \cdot 2^{5 n}$
A. $2^{7 n-2}$
B. $2^{7 n-4}$
C. $2^{6 n-2}$
D. $2^{6 n-4}$
E. NOTA
4. Find the greatest common factor of $2 x^{2} y^{3} z$ and $4 x^{5} y^{2}$.
A. $x y z$
B. $2 x^{2} y^{2}$
C. $2 x^{5} y^{3} z$
D. $4 x^{5} y^{3} z$
E. NOTA
5. What is the units digit of $2004^{2004}$ ?
A. 0
B. 2
C. 4
D. 6
E. NOTA
6. Which of the following is NOT divisible by 3 ?
A. 318762951572
B. 318762955401
C. 318762958362
D. 318762955404
E. NOTA
7. Find the units digit of $7^{2004}$.
A. 7
B. 9
C. 3
D. 1
E. NOTA
8. Convert $3030_{6}$ to base 10 .
A. 666
B. 524
C. 22010
D. 830
E. NOTA
9. Find the greatest common factor of 180 and 1386.
A. 5220
B. 36
C. 18
D. 9
E. NOTA
10. Find the product of all prime factors of 14399 .
A. 561
B. 1235
C. 1309
D. 14399
E. NOTA

11 Which of the following has the same value as $786_{9}$ ?
A. $1440_{5}$
B. $\quad 547_{11}$
C. $2553_{6}$
D. $11000100100_{2}$
E. NOTA

12 Let $\mathrm{A}=$ the units digit of $7^{1072}$
Let $B=$ the units digit of $8^{4056}$
Let $\mathrm{C}=$ the ten's digit of $11^{999}$
Let $\mathrm{D}=$ the units digit of $9^{2004}$
What is the value of $\frac{(A+B)^{2}}{(C+D)^{2}}$
A. $\frac{2}{3}$
B. $\frac{4}{9}$
C. $\frac{3}{2}$
D. $\frac{9}{4}$
E. NOTA

13 How many zeros are at the end of 2004!?
A. 1997
B. 499
C. 396
D. 196
E. NOTA

14 Simplify $\left(3 x^{2}\right)^{4}$
A. $81 x^{1 / 2}$
B. $81 x^{6}$
C. $81 x^{8}$
D. $81 x^{16}$
E. NOTA
15. Which of the following is NOT equivalent to $\left(x^{3}\right)^{5}$
A. $(x+x+x)(x+x+x)(x+x+x)(x+x+x)(x+x+x)$
B. $x^{15}$
C. $\left(x^{3}\right)\left(x^{3}\right)\left(x^{3}\right)\left(x^{3}\right)\left(x^{3}\right)$
D. $\left(x^{2} x\right)\left(x^{2} x\right)\left(x^{2} x\right)\left(x^{2} x\right)\left(x^{2} x\right)$
E. NOTA
$1622_{3}+41_{7}+8_{9}$ in base 10
A. 71
B. 45
C. 40
D. 55
E. NOTA

## Short Answer

17
If $4^{m}=16^{6}$ and $\left(\frac{1}{4}\right)^{n}=8^{2}$, find $m n$.

18 Simplify $\frac{27^{2 x} \cdot 9^{3 x}}{81^{3 x}}$

19 Consider the following statements. Write the letter of each true statement.
A) 0 is a prime number
B) 1 is a prime number
C) 2 is a prime number
D) A number divided by zero is undefined.
E) $0^{0}=1$
F) $0!=1$
G) $\frac{0}{0}=1$
H) $2^{0}=0$
I) $0^{2}=1$

20 Let $\mathrm{A}=$ the least common multiple of 3,15 and 51
Let $B=$ the greatest common factor of 14,91 and 98
Find the value of $\frac{7 A}{225 B}$

21 A certain 3-digit number has the following characteristics:
The value of the number is 28 times the sum of the three digits.
The units digit and the hundreds' digit are the same.
The ten's digit is one more that the sum of the other two digits. What is the 3-digit number?

22 How many factors of 7 does 34 ! have?

Consider the number $N=63000$.
23) How many integral factors does $N$ have?
24) How many of the factors of $N$ a units digit of zero?
25) How many of the factors of $N$ are multiples of 6?
26) How many of the factors of $N$ have a units digit of 5 ?
27) How many of the factors of $N$ have a digital sum which is a multiple of 3 ?
28) How many of the factors of $N$ end in two zeros?

