Math 9H HW 1.3 Prime Factorization, Perfect Squares, and Cubes (Calculators not Allowed)

- 1. Find the Prime factorization for each of the following numbers:
 - a) 24

d) 360

g) 9360

b) 17640

e) 9492

- h) 9418409
- 2. Indicate which of the following numbers are perfect squares, perfect cubes, or neither:
 - a) $N = 16 \times 3^3 \times 14$

e) $N = 8 \times 25 \times 81$

b) $N = 4^3 \times 9^3$

f) $N = 7 \times 7^2 \times 7^4$

c) $N = 3 \times 4^3 \times 12$

- g) $N = 27 \times 5^3 \times 135$
- ${\it 3.} \quad {\it Simplify each of the following expressions without a calculator:}$
- i) $\sqrt{12 \times 24}$

ii) $\sqrt{48 \times 243}$

iii) $\sqrt{32 \times 45 \times 8}$

iv) $\sqrt{6 \times 9 \times 24}$

v) $\sqrt{252 \times 567}$

vi) $\sqrt{147 \times 27 \times 289}$

vii) $\sqrt[3]{432 \times 375}$

viii) $\sqrt[3]{6 \times 60 \times 75}$

ix) $\sqrt[4]{252 \times 294 \times 42}$

	C:	• • . •	C. J. H. J. J.		de de la collection de la		
4.	Given that in	is an integer,	, fina the lowes	t value of N Su	ch that the follo	owing will be a	positive integer

a)
$$\sqrt{2^3 5^1 7^2 N}$$

b)
$$\sqrt{4^27^25^2N}$$

c)
$$\sqrt{3^4 5^3 12N}$$

d) $\sqrt{38412N}$

e)
$$\sqrt{13992N}$$

f)
$$\sqrt{664(N-1)}$$

g)
$$\sqrt[3]{2^311^349^2N}$$

h)
$$\sqrt[3]{6^5 5^2 15^2 N}$$

i)
$$\sqrt[3]{3^4 5^3 28N}$$

5. Given that N is an integer and $N \neq 0$, what is the lowest value of N so that "K" is i) a perfect square ii) a perfect cube iii) Both a perfect square and perfect cube $(Given\ K \neq 0)$

a)
$$K = N \times 3^3 \times 21$$

d)
$$K = (N-1) \times 7^7 \times 121$$

b)
$$K = N \times 3^3 \times 5^5$$

e)
$$K = N^2 + N$$

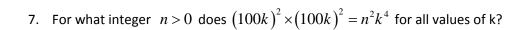
c)
$$K = N \times 75 \times 169$$

f)
$$K = (3N - 24)(N - 28)$$

6. Find the value of "N" in each equation:

$$18,000 = N \times 2^3 \times 5^3 \times 6$$

b)
$$80,640 = N \times 2^5 \times 12 \times 14$$



8. Let a, b, c, d, and e be distinct integers such that: (6-a)(6-b)(6-c)(6-d)(6-e) = 45. What is the value of a+b+c+d+e?

9. The number 1000 has 16 positive integral divisors. How many positive divisors does the number 3000 have?

10. Solve for 'n" $(n-23) \times 23! = (n-32)!32!$

11. If "N" is the product of three different primes, then its least possible value is $2 \times 3 \times 5 = 30$. If N < 100, what is N's largest possible value?

12. Challenge: Find the smallest value for N, such that N>1, so that the following expression is a perfect cube: $5N^3 + N^2 + 15N$