SOL HW 1.4p1

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Math 8 Honours Assignment 1.4 Prime Factorization and Number of Factors (Part 1)

1. Multiply the following without using a calculator:

a) $12\times16=$

① 10 2 / 10 | 100 | 20 / 6 | 60 | 12 = 192

or

$4\times3\times4\times4$
$=64\times3$
$=180+12$
$=192$

b) $15\times20=$

$15\times2\times10$
$=300$
(Easy)

c) $9\times16\times2=$

$3\times(3\times4)\times4\times2$
$12\times12\times2$
144×2
$=288$

d) $27\times4=$

$9\times3\times4$
$=9\times12$
$=108$
or
$90+18$
$=108$

e) $14\times21=$

$7\times2\times3\times7$
$=49\times6$
$=300-6=294$
or
$=49\times6$
$=240+54=294$

f) $8\times12\times6=$

$=96\times6$
$=540+36=576$
or
8×72
$=560+16$
$=576$

g) $15\times12\times35=$

$3\times5\times2\times6\times35$
$10\times3\times3\times2\times35$
$10\times9\times70$
$=630$

h) $18\times14\times5=$

$9\times2\times7\times2\times5$
$63\times2\times10$
$=1260$

i) $15\times24\times3=$

$3\times5\times2\times12\times3$
$10\times9\times12$
1080

2. Find the Prime Factorization for each of the following numbers without using a calculator:

a) 24

$=2^3\times3^1$

d) 845

$=5\times169$
$=5\times13^2$

169
5 | 845
34
4

13 × 13 = 39, 13, 169

g) 864

$=8\times108$
$=8\times4\times27$
$=2^3\times2^2\times3^3$
$=2^5\times3^3$

b) 1844

$= 922 \times 2$

$= 461 \times 2 \times 2$

$= 2^2 \times 461$

PRIME

e) 3844

1922×2

$= 961 \times 2 \times 2$

$= 31^2 \times 2^2$

h) 5040

$=$

$2^4 \times 3^2 \times 5^1 \times 7$

5040

504 × 10

252 × 2 · 2 · 5

4 · 63

9 × 7 ·

_____ _____ _____

c) 20124

5031 · 4

559 · 9

13 · 43

$= 2^2 \times 3^2 \times 13^1 \times 43^1$

f) 12056

1507 × 8 ·

11 · 137

$= 2^3 \times 11^1 \times 137$

i) 454,597

11 × 41327

11 · 3757

13 · 289

17 · 17

$= 11^2 \times 13 \times 17^2$

_____ _____ _____

3. Indicate which of the following are perfect squares:

a) ~~24~~, 36, 225, 169, ~~189~~, ~~224~~ _____

$6^2 = 36$

$15^2 = 225$

$13^2 = 169$

b) 16, ~~27~~, ~~72~~, ~~125~~, 289, 324 _____

$4^2 = 16$

$17^2 = 289$

$18^2 = 324$

c) ~~-25~~, 900, 1024, 144, ~~54~~, ~~-64~~ _____

$30^2 = 900$

$32^2 = 1024$

$12^2 = 144$

4. Indicate which of the following products will be perfect squares:

a) $2^4 \times 3^2 \times 5^2 =$ b) $2^2 \times 3^4 \times 7^2 =$ c) $3^4 \times 3^3 \times 75 =$

_____ _____ _____

d) $27 \times 24 \times 8 =$ e) $16 \times 36 \times 2 =$ f) $3 \times 12 \times 8 =$

_____ _____ _____

g) $2 \times 2^2 \times 2^3 =$ h) $5 \times 5^4 \times 5^6 =$ i) $2^3 \times 3^4 \times 12^3 =$

_____ _____ _____

5. Given that N is a natural number find the lowest value of N such that the square root will become a positive integer:

a) $2^3 5^1 7^2 N$ b) $4^2 7^2 5^2 N$ c) $3^4 5^3 12 N$

_____ _____ _____

d) $38412 \times N$ e) $13992 \times N$ f) $664 \times (N-1)$

_____ _____ _____

6. Given that N is an integer greater than one and $N \neq 0$, what is the lowest value of N so that "K" is a perfect square $(Given\ K \neq 0)$

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

_____

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

_____

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

_____

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

_____

e) $K = N^2 + N$

_____

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

_____

7. By looking at the prime factorization of a number, how can you determine whether if it is a perfect square or not? Explain:

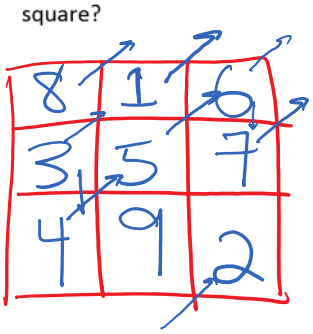
8. Explain how you would multiply the following using the prime factorization. Do Not use a calculator:
$15 \times 25 \times 35 \times 45 \times 16$

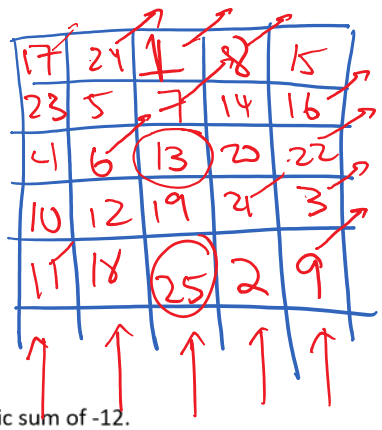
9. A building has 18 storeys above ground and 5 storeys below ground. If each storey is 5meters high, then how tall is the building?

10. In a magic square, the numbers in each row, column, and diagonal have the same sum. This is called the magic sum. What is the magic sum for this magic square?

2	3	- 2
-3	1	5
4	-1	0

b) Multiply each integer in the square by -2. Is the result another magic square? If so, what is the new magic square?





$1 \rightarrow 25 = \frac{25}{2}(26)$

value of each column $= \frac{5 \times 13}{25(26)} = 65$ //.

c) Create a magic square with a magic sum of -12.

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

a) $18{,}000 = N \times 2^3 \times 5^3 \times 6$

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

12. 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 $a+b+c+d+e$?

$(-1)(-3)(3)(5)(1)$

$(6-a)+(6-b)+(6-c)+(6-d)+(6-e) = -1+1+3+(-3)+5$

$30-a-b-c-d-e = 5$

$30-5 = a+b+c+d+e$

$25 = a+b+c+d+e$