Math 6 Unit 1 worksheet: Perfect, abundant, deficient and amicable numbers

Name _____ Date _____ Period _____

1. Find $s(n)$, the sum of the proper factors. Then say whether the number is perfect, abundant or deficient.

(a) 26

(b) 30

(c) 44

(d) 55

(e) 60

(f) 63

2. $76 = 2^2 \times 19$. Use the factorization to list the proper factors of 76 and find $s(76)$. Is 76 perfect, abundant or deficient, and by how much does the sum miss 76?

3. Daniel adds up the factors of 32 and gets $1 + 2 + 4 + 8 + 16 + 32 = 63$. Since $63 > 32$, he says 32 is abundant.

(a) What did Daniel do wrong? Is 32 perfect, abundant or deficient?

(b) The proper factors of a power of 2 add to 1023. Which power of 2 is it? Give it as a number and in the form 2^k.

4. (a) Suppose 66 belongs to an amicable pair. Explain why its partner could only be the number $s(66)$.

(b) Find $s(66)$ and use it to decide whether 66 belongs to an amicable pair.

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5. Euclid's rule with $k = 4$ would give $2^3 \times (2^4 - 1) = 8 \times 15 = 120$, but 15 is not prime, so the rule says nothing about 120.

(a) Use $120 = 2^3 \times 3 \times 5$ to list all 16 factors of 120.

(b) Find $s(120)$. Is 120 perfect, abundant or deficient? How does $s(120)$ compare with 120?

6. Take any prime and square it, for example $7^2 = 49$ or $13^2 = 169$. Explain why the square of a prime is always deficient.

7. You know that 6 and 28 are perfect, and that 12 and 20 are abundant. For each number below, either show it is a multiple of one of those four (which proves it is abundant), or find s of the number and say whether it is perfect, abundant or deficient.

(a) 90 (b) 98 (c) 140 (d) 175

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