Sections 2.1 and 2.2 – Important Questions

1) Can every integer, other than 0, be written as a power? Explain.

Yes, every integer can be written as a power because any integer can be written with an exponent of 1. For example, $46 = 46^1$

2) Why is -3^4 negative but $(-3)^4$ positive?

Repeated multiplication can be used to explain this. In -3^4, the negative sign is not part of the base of the power and, since there is only one negative sign in the expression, the product is negative: - 3 x 3 x 3 x 3 = -81. In $(-3)^4$, the sign is part of the base of the power and, since there is an even number of negative signs, the product is positive:
(-3)(-3)(-3)(-3) = 81.

3) Why are 4^0 and $(-4)^0$ equal to 1, while -4^0 is equal to -1?
In example 1, 4^0 and $(-4)^0$ are equal to 1 because any base with an exponent of 0 equals 1. -4^0 is equal to -1 because the negative sign is not part of the power.

4) What is a power?

A power is an expression that shows a number multiplied by itself several times, and is the product that results. For example, 9^3 is a power; it means 9 x 9 x 9, and is equal to 729. The base of a power is the number that is multiplied, and the exponent is the number of factors.

5) What is meant by "a power of 10"? Name 6 numbers that are powers of 10.

A "power of 10" is any number that can be written as a power with a base of 10. These are numbers such as one million, 100, 10 000, 10^9, one hundred billion, and 10^0.

6) Why are brackets used when a power has a negative base?

Brackets are used when a number has a negative base to show the negative sign is part of the base; for example $(-9)^3$ means (-9)(-9)(-9), and it equals -729.

7) How would you use patterns to explain that $\mathbf{10^0} = 1$.

Each time you divide a power of 10 by 10, the exponent is 1 less; for example, 10^4 (10 000) divided by 10 is 10^3 (1000). So when you divide 10^1 by 10 (or 10 ÷ 10) the quotient is 10^0, which equals 1.

8) Why is a power with exponent 0 equal to 1?
A power with an exponent 0 is equal to 1 because each time you divide a base of a power by itself, the exponent gets smaller by 1. When you divide any number with an exponent of 1 by itself, it is the same as dividing the number by itself, which equals 1. The exponent pattern is 0.

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