

6.EE Exponent Experimentation

3

Alignments to Content Standards: 6.EE.B.5 6.EE.A.1

Task

In each equation below, x can be replaced with a number that makes the equation true. Find such a number.

a. $64 = x^2$

b. $64 = x^3$

c. $2^x = 32$

d. $x = \left(\frac{2}{5}\right)^3$

e. $\frac{16}{9} = x^2$

f. $2 \cdot 2^5 = 2^x$

g. $2x = 2^4$

h. $4^3 = 8^x$

i. $x^2 = 25$

j. $(x + 1)^2 = 25$

IM Commentary

The purpose of this task is to give students experience working with exponential expressions and with what is meant by a solution to an equation. The intention of this task is for students to keep to the spirit of 6.EE.B.5 (rather than rehearsing some procedure):

Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.

The reasoning for some of these may take a few steps that represent reasoning appropriate in grade 6. For example, here is a way to reason about part (f):

$$\begin{aligned}2 \cdot 2^5 &= 2^x \\2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 &= 2^x \\2^6 &= 2^x\end{aligned}$$

Over the rational numbers, some of these equations also have solutions that are negative. However, since operations on negative numbers aren't a part of grade 6 standards, students will likely only consider positive values in this task, and that is acceptable at this stage (much in the same way we wouldn't expect them to come up with $-2 + 2i\sqrt{3}$ as a solution to part (b)). In order for students to check their work, a teacher might provide an opportunity to engage in MP3 by pairing them up and giving instructions to discuss any equations where the partners obtained different solutions.

The type of thinking required in moving from part (i) to (j) requires making use of structure (MP7) and seeing the $x + 1$ as a thing that is being squared. It might be nice to follow up work on these parts with a similar question that uses a number other than 1 or a perfect square other than 25.

[Edit this solution](#)

Solution

a. 8

b. 4

c. 5

d. $\frac{8}{125}$

e. $\frac{4}{3}$

f. 6

g. 8

h. 2

i. 5

j. 4



6.EE Exponent Experimentation 3

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