

Discovery Exercise for Imaginary Numbers

1. Explain, using words and equations, why the equation $x^2 = -1$ has no real answer, but $x^3 = -1$ does.

But suppose there *were* an answer to $x^2 = -1$? It couldn't be a real number such as 5, $-3/4$, or π . So we give it a new name: i for the *imaginary* number.

If $i^2 = -1$ then what is...

2. $i + 5i$?
3. $(i + 1)^2$? (*Hint*: it isn't zero!)
4. $(5 + 3i)(5 - 3i)$?

See Check Yourself #14 at felderbooks.com/checkyourself

5. $(3i)^2$?
6. $(\sqrt{2} i)^2$?
7. $(\sqrt{2}i)^2$?
8. $\sqrt{-25}$?
9. $\sqrt{-3}$?

If you rewrite $-i$ as $-1 \times i$, then what is...

10. $i(-i)$?
11. $(-i)^2$?
12. $(-3i)^2$?