Powers of *I*

Definitions: $\sqrt{-1} = i$

$i^2 = -1$

Look for the pattern **that is formed when *i* is raised to the powers 1, 2, 3, 4, and so on.**

i^1	$= i$	$= i$	$= i$
i^2	$= -1$	$= -1$	$= -1$
i^3	$= i^2 i$	$= (-1)i$	$= -i$
i^4	$= i^2\ i^2$	=	$= 1$
i^5	$= i^4 i$	=	=
i^6	=	=	=
i^7	=	=	=
i^8	=	=	=
i^9	=	=	=
i^{10}	=	=	=
i^{11}	=	=	=
i^{12}	=	=	=

Now simplify:

1. i^{17}	**2.** i^{22}	**3.** i^{38}
4. i^{40}	**5.** i^{67}	**6.** i^{90}
7. i^{152}	**8.** $3i \bullet 6i^3$	**9.** $2i \bullet \left(4i^3\right)^2$

For any positive real number b,

$$\sqrt{-(b^2)} = \sqrt{b^2} \bullet \sqrt{-1} = bi$$

Example:

$$\begin{aligned}\sqrt{-24} &= \sqrt{24} \bullet \sqrt{-1} \\ &= \sqrt{4 \bullet 6} \bullet i \\ &= 2i\sqrt{6}\end{aligned}$$

Practice
Simplify

10. $\sqrt{-256}$	**11.** $\sqrt{-80}$	**12.** $\sqrt{-4} \bullet \sqrt{-9}$
13. $\sqrt{-\frac{25}{121}}$	**14.** $\sqrt{-6} \bullet \sqrt{-12}$	**15.** $(7-3i)(8+4i)$
16. $\left(-3\sqrt{-5}\right)^2$	**17.** $\left(2\sqrt{-8}\right)\left(3\sqrt{-2}\right)$	**18.** $\left(2i \bullet 3i^2\right)^2$
19. $(3i)^3 \bullet (2i)^2$	**20.** $-\sqrt{15} \bullet \sqrt{-15}$	**21.** $\left(\sqrt{-13}\right)^2$