



Museum Diamond Case File

Solve the algebraic symbol equations to determine the passcode and override the security lock on the museum vault.

Name: _____ Date: _____

1 THE KEY

$$\blacktriangle = 23 \quad \star = 1 \quad \oplus = \boxed{} \quad \textcircled{?} = \boxed{} \quad \text{?} = \boxed{}$$

Every symbol is a whole number from 1 to 30. A number in front of a shape means multiply: 2 stars = 2 x star. A small 2 after a shape means square it: $\text{star}^2 = \text{star} \times \text{star}$. $\text{sqrt}(\text{shape})$ is the square root of that shape's value.

2 FIND THE MISSING VALUES

Some shapes in the key are missing. Use these to work them out, in order, and write them into the key.

$$\begin{aligned}\oplus + 2\textcircled{?} &= 29 \\ 2\oplus - 3\textcircled{?} &= -12\end{aligned}$$

$$2\blacksquare + \textcircled{?} = 60$$

$$\blacklozenge \times \textcircled{?} = 20$$

3 CRACK THESE

$$1. \oplus \times \blacksquare - \star^2 = \boxed{}$$

$$2. (\blacklozenge - \star) \times (\blacklozenge + \star) = \boxed{}$$

CODE 1

$$3. \text{sqrt}(\oplus) + \star = \boxed{}$$

$$4. (\blacksquare - \blacklozenge) \times (\blacksquare + \blacklozenge) = \boxed{}$$

CODE 2

$$5. 3\blacktriangle - 2\blacksquare + \star = \boxed{}$$

$$6. (\blacktriangle + \blacksquare)^2 = \boxed{}$$

CODE 3

$$7. \text{sqrt}(\oplus) + \oplus^2 = \boxed{}$$

$$8. \blacksquare \times \textcircled{?} - \oplus^2 = \boxed{}$$

CODE 4

$$9. (\blacksquare + \star)^2 = \boxed{}$$

$$10. \textcircled{?}^3 - \blacktriangle = \boxed{}$$

4 THE VAULT CODE

Write the ONES digit of your answers to problems 2, 4, 6, 8 (the ones tagged CODE 1-4), in that order. That opens the museum laser vault.

Answer Key

Museum Diamond Case File · Grade 8 Crack the Code

The key

 triangle = **23**
  star = **1**
  cross = **9** (hidden)
  moon = **10** (hidden)
  hexagon = **2** (hidden)

 square = **25** (hidden)

Every symbol is a whole number from 1 to 30.

1. $\text{+} \times \blacksquare - \star^2$ (cross x square - star²) **224**
2. $(\hexagon - \star) \times (\hexagon + \star)$ ((hexagon - star) x (hexagon + star)) **3**
3. $\text{sqrt}(\text{+}) + \star$ (sqrt(cross) + star) **4**
4. $(\blacksquare - \hexagon) \times (\blacksquare + \hexagon)$ ((square - hexagon) x (square + hexagon)) **621**
5. $3\triangle - 2\blacksquare + \star$ (3 x triangle - 2 x square + star) **20**
6. $(\triangle + \blacksquare)^2$ ((triangle + square)²) **2304**
7. $\text{sqrt}(\text{+}) + \text{+}^2$ (sqrt(cross) + cross²) **84**
8. $\blacksquare \times \text{moon} - \text{+}^2$ (square x moon - cross²) **169**
9. $(\blacksquare + \star)^2$ ((square + star)²) **676**
10. $\text{moon}^3 - \triangle$ (moon³ - triangle) **977**

Vault code: 3 1 4 9