SQUARES AND SQUARE ROOTS

Before working with geometric formulas, you need to be familiar with squares and square roots.

Squares

The **square** of a number is that number multiplied by itself. The square of 6 is $6 \times 6 = 36$. In symbols, we write the square of a number **as a base and an exponent.**

6×6 is written 6^2 ← exponent
↑ base

The exponent (2) tells how many times to write the base (6) as a **factor** (a number being multiplied). The exponent of a square is always 2. Read 6^2 as "6 squared," or "6 to the second power." The **value** of 6^2 is 36. Here are three more examples:

Squared Number	As a Base and an Exponent	Word Expression	Value
4×4	4^2	"four squared"	16
7×7	7^2	"seven squared"	49
10×10	10^2	"ten squared"	100

Square Roots

To find the **square root** of a number, you ask, "What number times itself equals this number?"

What number times itself equals 25? The answer is 5: $5 \times 5 = 25$.

The symbol for square root is $\sqrt{\ }$. We write $5 = \sqrt{25}$.

The table below contains the squares of numbers from 1 to 15. These numbers 1, 4, 9, 16, and so on, are called **perfect squares** because their square roots are whole numbers.

Table of Perfect Squares

$1^2 = 1$	$6^2 = 36$	$11^2 = 121$
$2^2 = 4$	$7^2 = 49$	$12^2 = 144$
$3^2 = 9$	$8^2 = 64$	$13^2 = 169$
$4^2 = 16$	$9^2 = 81$	$14^2 = 196$
$5^2 = 25$	$10^2 = 100$	$15^2 = 225$

The values in this table are used to find the square roots of these perfect squares. For example, to find the square root of 144, look for 144 in the table.

The table shows that $12^2 = 144$, so $12 = \sqrt{144}$.

➤ **Find the value of each square.**

1. $5^2 =$
2. $8^2 =$
3. $10^2 =$
4. $\left(\frac{1}{2}\right)^2 =$
5. $\left(\frac{3}{4}\right)^2 =$
6. $\left(\frac{2}{3}\right)^2 =$
7. $(1.4)^2 =$
8. $(3.2)^2 =$
9. $(5.6)^2 =$

➤ **Use the table of perfect squares to find each square root below.**

10. $\sqrt{25} =$
11. $\sqrt{49} =$
12. $\sqrt{196} =$
13. $\sqrt{169} =$
14. $\sqrt{225} =$
15. $\sqrt{36} =$
16. $\sqrt{16} =$
17. $\sqrt{100} =$
18. $\sqrt{121} =$

➤ **Find each value. *Find the value of each squared number before finding the sum or difference.* In 22–24, find the square root as the final step.**

19. $3^2 + 5^2 =$
20. $7^2 - 5^2 =$
21. $11^2 - 10^2 =$
22. $\sqrt{3^2 + 4^2} =$
23. $\sqrt{13^2 - 12^2} =$
24. $\sqrt{6^2 + 8^2} =$

➤ **Estimate the value of each square root below. Two are done as examples. The symbol ≈ means "is approximately equal to."**

25. $\sqrt{35} \approx 6$
26. $\sqrt{48} \approx$
27. $\sqrt{73} \approx 8.5$
28. $\sqrt{30} \approx$
29. $\sqrt{101} \approx$
30. $\sqrt{132} \approx$

➤ **Find the value of each square.**

1. $5^2 =$ 25
2. $8^2 =$ 64
3. $10^2 =$ 100
4. $\left(\frac{1}{2}\right)^2 =$ $\frac{1}{4}$
5. $\left(\frac{3}{4}\right)^2 =$ $\frac{9}{16}$
6. $\left(\frac{2}{3}\right)^2 =$ $\frac{4}{9}$
7. $(1.4)^2 =$ 1.96
8. $(3.2)^2 =$ 10.24
9. $(5.6)^2 =$ 31.36

➤ **Use the table of perfect squares to find each square root below.**

10. $\sqrt{25} =$ 5
11. $\sqrt{49} =$ 7
12. $\sqrt{196} =$ 14
13. $\sqrt{169} =$ 13
14. $\sqrt{225} =$ 15
15. $\sqrt{36} =$ 6
16. $\sqrt{16} =$ 4
17. $\sqrt{100} =$ 10
18. $\sqrt{121} =$ 11

➤ **Find each value. *Find the value of each squared number before finding the sum or difference.* In 22–24, find the square root as the final step.**

19. $3^2 + 5^2 =$ 34
20. $7^2 - 5^2 =$ 24
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