

Introduction to Simplifying Radicals

Simplify Each Radical:

1) $\sqrt{48}$

2) $\sqrt{128}$

3) $\sqrt{363}$

4) $\sqrt{45}$

5) $\sqrt{25x^2}$

6) $\sqrt{72x^8}$

7) $\sqrt{432x^{16}y^8}$

8) $\sqrt{392x^{100}y^{210}}$

9) $\sqrt{x^9}$

10) $\sqrt{x^9y^{10}}$

11) $\sqrt{x^9y^{11}}$

12) $\sqrt{25x^9y^{11}}$

13) $\sqrt{162x^{10}y^5}$

14) $\sqrt{75x^7y^3}$

15) $\sqrt{300x^5y^{12}}$

16) $\sqrt{169x^{100}y^{64}}$

17) $\sqrt{108x^{16}y^{25}}$

18) $\sqrt{98x^{1000}y^{500}}$

19) $\sqrt{600x^{11}y^{14}}$

20) $\sqrt{-36}$

Q3 Quiz 1 Review

1) $\sqrt[13]{720x^{13}y^{16}}$

2) $\sqrt[9]{384x^9y^{25}}$

3) $\sqrt[16]{289x^{16}y^{36}}$

4) $\sqrt[90]{338x^{90}y^{41}}$

5) $\sqrt[18]{245x^{18}y^{30}}$

6) $\sqrt[19]{252x^{19}y^{33}}$

7) $\sqrt[6]{25x^{23}y^{17}}$

8) $\sqrt[2]{242x^{14}y^{100}}$

9) $\sqrt[5]{29x^{64}y^{144}}$

10) $\sqrt[2]{243x^{31}y^{39}}$

11) $\sqrt[3]{1,024x^{43}y^{27}}$

12) $\sqrt[3]{325x^{31}y^{42}}$

Addition/Subtraction

1. $8\sqrt{242} + 3\sqrt{162}$

2. $7\sqrt{720} + 11\sqrt{245}$

3. $18\sqrt{150} - 10\sqrt{243}$

4. $5\sqrt{147} - 7\sqrt{75}$

5. $-7\sqrt{252} + 5\sqrt{567}$

6. $3\sqrt{80} - 7\sqrt{180} - 6\sqrt{200}$

Q3 Quiz 1 Review

1. $8\sqrt{242} + 3\sqrt{162}$

2. $7\sqrt{720} + 11\sqrt{245}$

3. $18\sqrt{150} - 10\sqrt{243}$

4. $5\sqrt{147} - 7\sqrt{75}$

5. $-7\sqrt{252} + 5\sqrt{567}$

6. $3\sqrt{80} - 7\sqrt{180} - 6\sqrt{200}$

7. $5\sqrt{1,183} + 11\sqrt{448}$

8. $9\sqrt{605} + 8\sqrt{180}$

9. $20\sqrt{578} - 10\sqrt{1,458}$

10. $11\sqrt{96} - 3\sqrt{600}$

11. $-7\sqrt{605} + 9\sqrt{245}$

12. $16\sqrt{242} - 6\sqrt{288} - 4\sqrt{392}$

Multiplication:

1) $(-3\sqrt{6})(8\sqrt{12})$

2) $(5\sqrt{18})(6\sqrt{24})$

3) $9\sqrt{2}(6\sqrt{96} - 4\sqrt{160})$

4) $-7\sqrt{3}(3\sqrt{150} - 4\sqrt{18})$

5) $(9 - 5\sqrt{5})(8 - 3\sqrt{5})$

6) $(4 - 3\sqrt{2})(7 + 5\sqrt{6})$

7) $(8 - 3\sqrt{2})(9 + 3\sqrt{2})$

8) $(-4 + 6\sqrt{5})(-4 - 6\sqrt{5})$

Q3 Quiz 13 Review

1) $(-6\sqrt{8})(8\sqrt{32})$

2) $(9\sqrt{24})(-7\sqrt{50})$

3) $5\sqrt{5}(4\sqrt{180} - 8\sqrt{90})$

4) $-4\sqrt{2}(3\sqrt{147} - 4\sqrt{125})$

5) $(6 + 4\sqrt{11})(10 - 7\sqrt{11})$

6) $(5 - 6\sqrt{3})(8 + 7\sqrt{6})$

7) $(8 - 10\sqrt{2})(9 - 11\sqrt{2})$

8) $(-8 + 5\sqrt{7})(-8 - 5\sqrt{7})$

Division:

- 1) Divide numbers 1st to see if you can reduce fraction.
- 2) Reduce each radical that is left.
- 3) Cancel where you can.
- 4) If there is still a radical in the denominator after canceling, you must *RATIONALIZE THE DENOMINATOR*.

$$9) \frac{9\sqrt{294}}{7\sqrt{486}}$$

$$10) \frac{14\sqrt{90}}{3\sqrt{245}}$$

$$11) \frac{12\sqrt{450}}{5\sqrt{216}}$$

$$12) \frac{13\sqrt{605}}{33\sqrt{338}}$$

$$13) \frac{5\sqrt{243}}{18\sqrt{384}}$$

$$14) \frac{7\sqrt{96}}{4\sqrt{392}}$$

15) $\frac{\sqrt{6}}{7-\sqrt{2}}$

16) $\frac{6-\sqrt{2}}{4-\sqrt{5}}$

17) $\frac{6-\sqrt{3}}{5-\sqrt{3}}$

18) $\frac{6-\sqrt{3}}{3+\sqrt{6}}$

Q3 Quiz 4 Review

1) $\frac{16\sqrt{175}}{10\sqrt{448}}$

2) $\frac{21\sqrt{90}}{6\sqrt{147}}$

3) $\frac{32\sqrt{392}}{14\sqrt{192}}$

4) $\frac{9\sqrt{726}}{66\sqrt{486}}$

5) $\frac{18\sqrt{675}}{30\sqrt{72}}$

6) $\frac{28\sqrt{338}}{52\sqrt{294}}$

7) $\frac{\sqrt{6}}{5-\sqrt{3}}$

8) $\frac{5-\sqrt{10}}{9-\sqrt{2}}$

9) $\frac{10-\sqrt{5}}{7-\sqrt{5}}$

10) $\frac{8-\sqrt{5}}{6+\sqrt{10}}$

Imaginary Numbers

You can't take the square root of -36 (or of any other negative number). Think about it.

36 = ± 6, because 6 · 6 = 36 and -6 · -6 = 36. But you cannot multiply a number by itself and get a negative number. We use the imaginary unit i to write the square root of any negative number.

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

$$\sqrt{-36}$$

$$\sqrt{-192}$$

$$\sqrt{-396}$$

$$\sqrt{-34}$$

$$\sqrt{36} \cdot -1$$

$$\sqrt{64} \cdot 3 \cdot -1$$

$$\sqrt{36} \cdot 11 \cdot -1$$

$$\sqrt{34} \cdot -1$$

$$6i$$

$$8i\sqrt{3}$$

$$6i\sqrt{11}$$

$$i\sqrt{34}$$

Simplify Each Radical:

9) $\sqrt{-8}$

10) $\sqrt{-50}$

11) $\sqrt{-242}$

12) $\sqrt{-125}$

13) $\sqrt{-384}$

14) $\sqrt{-245}$

15) $\sqrt{-588}$

16) $\sqrt{-361}$

Simplifying with i:

$$\begin{array}{ccccc}
 i^1 = & i^5 = & i^9 = & i^{13} = & i^{33} = \\
 i^2 = & i^6 = & i^{10} = & i^{14} = & i^{38} = \\
 i^3 = & i^7 = & i^{11} = & i^{15} = & i^{43} = \\
 i^4 = & i^8 = & i^{12} = & i^{16} = & i^{44} =
 \end{array}$$

When simplifying and using operations with imaginary numbers, you are not allowed to leave i with an exponent. How possible terms can you have when you simplify? _____

We have a simple way of remembering how to simplify:

$$\begin{array}{cccc}
 17) i^1 & 18) i^2 & 19) i^3 & 20) i^4 \\
 21) i^5 & 22) i^6 & 23) i^7 & 24) i^8 \\
 25) i^9 & 26) i^{10} & 27) i^{11} & 28) i^{12} \\
 29) i^{21} & 30) i^{33} & 31) i^{32} & 32) i^{26} \\
 33) (\sqrt{-10})^2 & 34) \sqrt{-10} \cdot \sqrt{-20} & 35) \sqrt{-3} \cdot \sqrt{-12} & 36) \sqrt{-18} \cdot \sqrt{-6} \\
 37) (3i)^2 & 38) (i\sqrt{3})^2 & 39) (-i)^2 & 40) -i^2
 \end{array}$$

Complex Numbers

A complex number is a number that is the sum of a real number and a regular number. Each complex number should be written in the standard form $a + bi$. **Example:** $8 + 3i$

Perform the indicated operation:

41) $(4 + 2i) + (7 - 2i)$

42) $3(6-2i) - 4(4 + 3i)$

43) $5i(3 + 2i) - 3i(4 + 8i)$

44) $(3 - 2i)(4 + 5i)$

45) $(11 - 5i)(7 - 3i)$

46) $(4 + 5i)(7 - 3i)$

47) $2i^2(3 - 8i) - 4i(12 - 7i)$

48) $(9 + 3i)(12 + 2i)$

49) $5i^2(3 + 2i) - 3i^2(4 + 8i)$

50) Simplify:

$i^{21} =$

$i^{58} =$

$i^{92} =$

$i^{123} =$

$i^{45} =$

$i^{26} =$

$i^{61} =$

$i^{19} =$

$i^{129} =$

$i^{58} =$

$i^{35} =$

$i^{72} =$

$i^{14} =$

$i^{106} =$

$i^{74} =$

$i^{48} =$

$i^{87} =$

$i^{66} =$

$i^{116} =$

$i^{1,000} =$

51) $\sqrt{-363}$

52) $\sqrt{-384}$

53) $8\sqrt{-361}$

54) $-7\sqrt{-176}$

55) $9\sqrt{-648}$

56) $13(6 - 5i) + 7(-11 + 9i)$

57) $6i(3 - 8i) - 10(7 + 12i)$

58) $11(4 + 3i) + 5i(9 + 8i)$

59) $14i(3 - 2i) - 5i^2(-12 - 11i)$

60) $(10 - 4i)(7 + 6i)$

62) $(9 - 8i)(4 - 7i)$

63) $(12 + 5i)(-4 - 9i)$

64) $(11 + 3i)(8 + 9i)$

65) $(6 - 9i)(10 + 8i)$

66) $(13 + 9i)(4 - 3i)$

67) $(4 - 6i)(5 + 8i)$

68) $(7 + 5i)(10 + 7i)$

69) $(8 + 6i)(12 - 9i)$

70) $(12 - 9i)(5 - 4i)$

Q3 Quiz 5 Review

1) Simplify:

$i^{43} =$

$i^{54} =$

$i^{128} =$

$i^{87} =$

$i^{145} =$

$i^{66} =$

$i^{91} =$

$i^{118} =$

$i^{232} =$

$i^{213} =$

2) $\sqrt{-432}$

3) $\sqrt{-726}$

4) $8\sqrt{-484}$

5) $-7\sqrt{-320}$

6) $9\sqrt{-578}$

7) $11(4 - 5i) + 7(-9 + 8i)$

8) $8i(3 - 7i) - 12(13 + 6i)$

9) $14(5 + 3i) + 9i(9 + 8i)$

10) $4i(3 - 2i) - 10i^2(-12 - 11i)$

11) $(12 - 4i)(2 + 6i)$

12) $(15 - 4i)(6 - 7i)$

13) $(9 + 5i)(-7 - 10i)$

14) $(11 + 3i)(11 - 3i)$

15) $(8 - 11i)(9 + 12i)$

16) $(5 + 9i)(8 - 2i)$

17) $3(14 - 11i) + 7(8 + 3i)$

18) $5(7 + 5i) - 9(10 + 7i)$

19) $9(8 + 6i) - 8i(12 - 9i)$

20) $8i^3(11 - 2i) + 3i^2(5 - 4i)$