Chapter 9 – Roots and Radicals

we only do square roots in math 65.

Section 9.1 Finding Roots

Square roots: Look for perfect squares:

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

2. $\sqrt{16}$ means what number squared equals 16?

$\sqrt{16} = 4$

4. $-\sqrt{16}$

$= -4$ Bring down the negative on the outside

6. $\sqrt{-16}$ what number squared equals -16?

= Not a real number

$4 \cdot 4 = 16$
$(-4)(-4) = 16$

no way to get a negative with an even power

8. $\sqrt{\frac{1}{49}}$

$= \frac{1}{7}$ because $\frac{1}{7} \cdot \frac{1}{7} = \frac{1}{49}$

12. $-\sqrt{\frac{1}{121}}$

$= -\frac{1}{11}$

18. $\sqrt{51+13}$ add inside first → cannot separate with addition or subtraction $\sqrt{51+13} \neq \sqrt{51} + \sqrt{13}$

$= \sqrt{64}$

$= 8$

24. $\sqrt{25} - \sqrt{16}$

$= 5 - 4$

$= 1$

32. $\sqrt{11}$ Enter in your calculator

≈ 3.317 $\boxed{\sqrt{\ }}$ 11 enter

38. $14 + \sqrt{13}$ Enter

≈ 17.606 14 $\boxed{+}$ $\boxed{\sqrt{\ }}$ 13 enter

42. $\dfrac{-7+\sqrt{839}}{5}$ ← need parentheses around the numerator or denominator when there is more than 1 term

$(-7+\sqrt{839}) \div 5$

≈ 4.393

46. $\sqrt{4-21} = \sqrt{-17}$

not a real number calculator says domain error

Optional – if covered in your class

Higher roots

$\sqrt[3]{\ }$ cube root

$\sqrt[4]{\ }$ fourth root

index → $\sqrt[5]{\ }$ fifth root

48. $\sqrt[3]{27}$ Look for perfect cubes

$27 = 3 \cdot 3 \cdot 3$

$= 3$

54. $\sqrt[3]{\frac{1}{1000}}$ $1 = 1 \cdot 1 \cdot 1$

$1000 = 10 \cdot 10 \cdot 10$

$= \frac{1}{10}$

58. $\sqrt[5]{1}$ $1 = 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1$

$= 1$

62. $-\sqrt[4]{81}$ $81 = (\ )^4$

↑ what number raised to the 4th power is 81?

$= -3$

$3 \cdot 3 \cdot 3 \cdot 3 = 81$

↓ ↓

3 3

74. $-\sqrt[6]{64}$

$= -2$