Name: _____ Date: _____

Learning Goal 5.4	Solve radical equations, identifying extraneous roots and restrictions to the domain.

1. State any restrictions on the variable, if any. Solve.

a. $1+\sqrt{\frac{7x}{3}}=8$

$\frac{7x}{3}\geq 0$

$x\geq 0$

$\sqrt{\frac{7x}{3}}=7$

$\frac{7x}{3}=49$

$7x=147$

$x=21$

$1+\sqrt{\frac{7(21)}{3}}=8$

$1+\sqrt{7(7)}=8$

$1+\sqrt{49}=8$

$1+7=8$

$8=8$

So the solution to the equation is $x=8$.

b. $5-\sqrt{2x}=-1$

$2x\geq 0$

$x\geq 0$

$-\sqrt{2x}=-6$

$\sqrt{2x}=6$

$2x=36$

$x=18$

$5-\sqrt{2(18)}=-1$

$5-\sqrt{36}=-1$

$5-6=-1$

$-1=-1$

So the solution to the equation is $x=18$.

c. $\sqrt{4-x}=-2$

$4-x\geq 0$

$4\geq x$

$x\leq 4$

$4-x=4$

$-x=0$

$x=0$

So the solution to the equation is $x=0$.

d. $\sqrt{2x-5}=\sqrt{x-7}$

$2x+5\geq 0$

$2x\geq -5$

$x\geq -\frac{5}{2}$

(less restrictive)

$2x-5=x-7$

$x-5=-7$

$x=-2$

$x-7\geq 0$

$x\geq 7$

(more restrictive)

so

$x\geq 7$

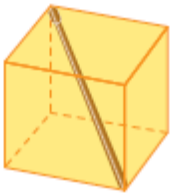
The solution lies outside the bounds, so there are no real roots to the equation.

2. Josh is shipping several small musical instruments in a cube-shaped box, including a drumstick which just fits diagonally in the box. Determine the formula for the length, d, in centimetres, of the drumstick in terms of the area, A, in square centimetres, of one face of the box. What is the area of

one face of a cube shaped box that holds a drumstick of length 23.3 cm? Express your answer to the nearest square centimetre.

Let $d =$ the length of the drumstick.

Let $x =$ the side length of the box, in centimetres. Then the area of one face is x^2 cm^2.



The drumstick forms a right triangle, its height being x cm and its base being the diagonal of a face, $\sqrt{2}x$ cm.

$$\sqrt{x^2 + x^2} = \sqrt{2}x$$

$$d = \sqrt{(x)^2 + \left(\sqrt{2}x\right)^2}$$

$$d = \sqrt{x^2 + 2x^2}$$

$$d = \sqrt{3x^2}$$

$$d = \sqrt{3A}$$

$$23.3 = \sqrt{3A}$$

$$542.89 = 3A$$

$$542.89 = 3A$$

$$A = 181$$

The area of one face of the box is 181 cm^2.