

Name Solution

- 1) Solve the following equations symbolically (i.e. algebraically) (2 points each)  
Check your results.

a)  $\sqrt[4]{t+1} = 2$

$$t+1 = 2^4$$

$$t+1 = 16$$

$$\boxed{t = 15}$$

c)  $\sqrt[3]{2z-4} = -2$

$$2z-4 = (-2)^3$$

$$\begin{array}{r} 2z-4 = -8 \\ +4 \quad +4 \\ \hline \end{array}$$

$$2z = -4$$

$$\boxed{z = -2}$$

b)  $\sqrt{x+6} = x$

$$(\sqrt{x+6})^2 = x^2$$

$$x+6 = x^2$$

$$x^2 - x - 6 = 0$$

$$(x-3)(x+2) = 0$$

$$\boxed{x=3}$$

~~$$x = -2$$~~

d)  $\sqrt{b^2-4} = b-2$

$$b^2-4 = (b-2)^2$$

$$b^2-4 = b^2-4b+4$$

$$-8 = -4b$$

$$\boxed{2 = b}$$

- 2) Use imaginary unit to write the expression.

(2 points)

a)  $\sqrt{-12} = \sqrt{4}\sqrt{3}i = 2\sqrt{3}i$

b)  $\sqrt{-18} = \sqrt{9}\sqrt{2}i = 3\sqrt{2}i$

c)  $\sqrt{-144} = 12i$

d)  $\sqrt{-100} = 10i$

3. Suppose that a baseball is thrown upward with an initial velocity of 66 feet per second and it is released 6 feet above the ground. Its height  $h$  after  $t$  seconds is given by

$$h(t) = -16t^2 + 66t + 6.$$

a) After how many seconds does the baseball reach a maximum height? (2 points)

$$x = \frac{-b}{2a} = \frac{-66}{2(-16)} = \frac{-66}{-32} = \frac{+33}{16} = 2.0625 \text{ sec}$$

b) What is the maximum height? (2 points)

$$y = 74.0625 \text{ feet}$$

4. Write the vertex form of a parabola that satisfies the following condition.

Vertex  $(5, -2)$  and  $a = -\frac{1}{2}$  (2 points)

$$y = -\frac{1}{2}(x-5)^2 - 2$$

b) Write the above equation in the form of  $y = ax^2 + bx + c$  (2 points)

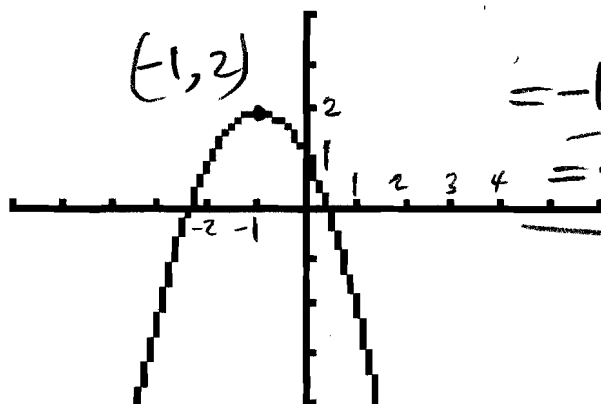
$$y = -\frac{1}{2}(x^2 - 10x + 25) - 2$$

$$= -\frac{1}{2}x^2 + 5x - \frac{25}{2} - 2 = -\frac{1}{2}x^2 + 5x - \frac{29}{2}$$

5. Write the vertex form of the parabola shown in the following graph.

Assume  $a = \pm 1$

(2 points)



$$y = a(x-h)^2 + k$$

$$= -1(x - (-1))^2 + 2$$

$$= -1(x+1)^2 + 2$$