1) $h = -16t^2 + 1600$ ← y-int = (0, 1600)

To find where it hits the ground, make $h = 0$

$$\frac{0}{-16} = \frac{-16t^2 + 1600}{-16} \longrightarrow 0 = t^2 - 100$$

I can solve by factoring or by reversing operations.

Factoring

$0 = t^2 - 100$

	t	$+10$
t	t^2	$10t$
-10	$-10t$	-100

$0 = (t+10)(t-10)$

$t = -10, t = 10$

Reversing Operations

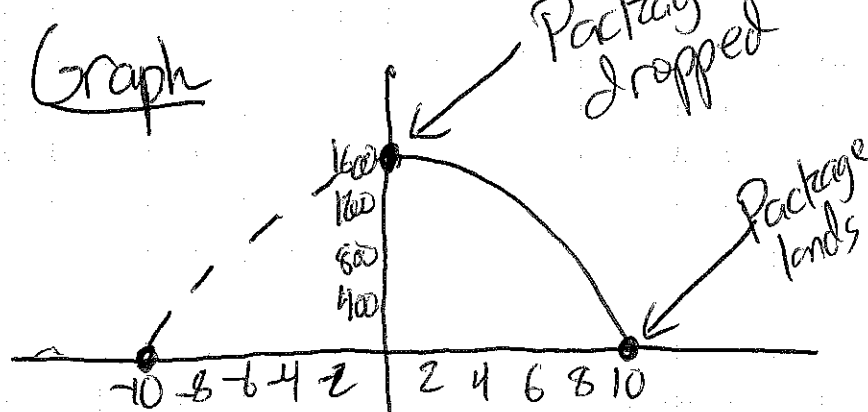
$0 = t^2 - 100$

$+100 \quad +100$

$\sqrt{100} = \sqrt{t^2}$

$\pm 10 = t$

Graph



Table

t	h
0	1600
1	1584
2	1536
3	1456
4	1344
5	1200
6	1024
7	816
8	576
9	304
10	0

The package hits the ground in 10 seconds

3) $h = -16t^2 + 48t + 160$ ← y-int = (0, 160)

To find where the rocket hits the ground, make $h = 0$.

$$\frac{0}{-16} = \frac{-16t^2 + 48t + 160}{-16} \rightarrow 0 = t^2 - 3t - 10$$

I can solve by Factoring or by reversing operations.

Factoring

	t	-5
t	t^2	$-5t$
$+2$	$2t$	-10

$\rightarrow (t-5)(t+2) = 0$

$t = 5$, ~~$t = -2$~~

I ignore the negative answer because that means going back in time.

Reversing Operations

	t	-1.5	
t	t^2	$-1.5t$	-10
-1.5	$-1.5t$	2.25	-2.25

$(t-1.5)^2 - 12.25 = 0$

$\sqrt{(t-1.5)^2} = \sqrt{12.25}$

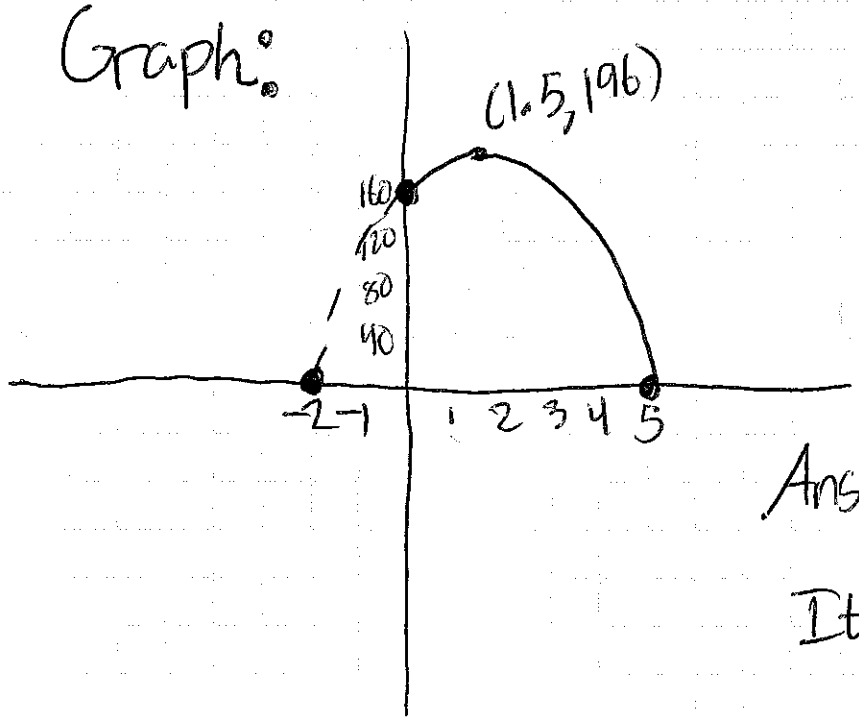
$t - 1.5 = 3.5$

$t = 5$

$t - 1.5 = -3.5$

~~$t = -2$~~

Graph:



Finding Vertex: $\frac{-2+5}{2} = \frac{3}{2} = 1.5$

$y = -16(1.5)^2 + 48(1.5) + 160$

$y = 196$

Answer: The rocket hits the ground after 5 seconds. Its max height is 196 feet, after 1.5 seconds.