Level 1 Questions. ; Bird that hit king Pig → Black. Proof;

→ Yellow bird → $y = -2x^2 + 12x - 10$

Vertex = $x = \frac{-b}{2a}$ $b = 12$ $a = -2$

$\frac{-12}{2(-2)} \quad \frac{-12}{-4} = 3$ $x = 3$

$y = -2(3)^2 + 12(3) - 10 = 8$

$y = 8$ peak → (3, 8)

Pig (11, 8)

$x = \frac{-b}{2a}$ Make a the subject.

$\frac{2a}{2} = \frac{-b}{2x}$ $a = \frac{-b}{2x}$ $a = \frac{-12}{2(11)}$ $a = -\frac{12}{22}$ $a = -\frac{6}{11}$

a → is the direction of the parabola and should be the same.

OR substitute.

Pig(11, 8) $y = -2x^2 + 12x + 10$

$8 = -2(11)^2 + 12(11) - 10 = 100$ Not equal.

Hence the yellow bird won't hit king Pig at (11, 8)

→ Blue starts (0, 0) 5 yards lands (20, 0).

Vertex = $\frac{0 + 20}{2} = 10 \rightarrow x$ $y \rightarrow 5$

(10, 5)

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

$0 = a(0 - 10)^2 + 5 \rightarrow -5 = a(-10)^2 \rightarrow \frac{100a}{100} = \frac{-5}{100} \rightarrow a = -\frac{1}{20}$

$y = -\frac{1}{20}(x - 10)^2 + 5$.

Pig (11, 8) to find a

$8 = a(11 - 10)^2 + 5 \rightarrow 8 - 5 = a(1)^2 \rightarrow a = 3$; a should be $-\frac{1}{20}$

Hence blue doesn't hit Pig at (11, 8)

→ Black

$y = -0.25(x-9)^2 + 9$

$y = a(x-h)^2 + k$ vertex = (9, 9)

Pig (11, 8)

$8 = a(11-9)^2 + 9$

$8 - 9 = a(2)^2$

$\frac{4a}{4} = \frac{-1}{4}$ → 0.25 → $a = -0.25$, a is the same in both.

Hence the Black bird hits king Pig at (11, 8) through a turning point of (9, 9)

⟹

→ Bird that reached the highest altitude was the Black bird at a maximum height of 9 yards.

→ This was 4 yards higher than the lowest altitude (5yds)

→ The blue bird was in the air the longest and it was there for 20 seconds.

→ It took 10 seconds before it started to descend.