ST. JEAN DE BREBEUF MATHEMATICS

CHAPTER 8.1

INTERPRET QUADRATIC RELATIONS

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KEY CONCEPTS

A quadratic relation can be represented by a graph, or by an equation of the form $y = ax^2 + bx + c$ ($a \neq 0$).

The equation or the graph of a quadratic relation can be used to solve problems.

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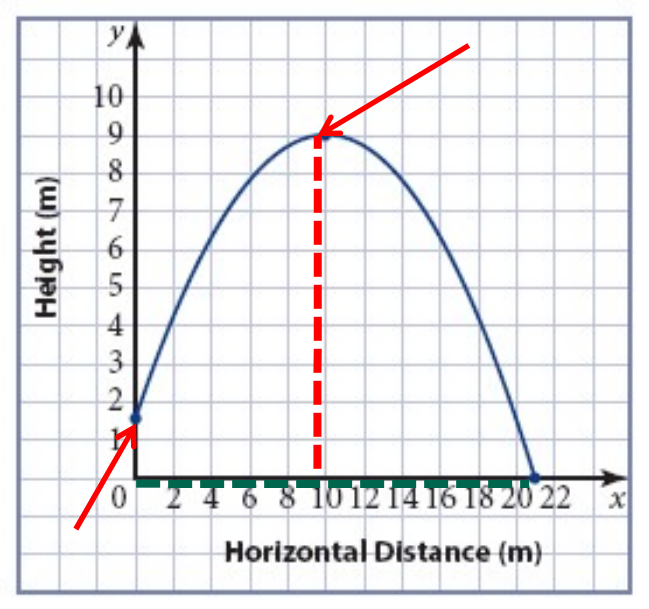
EXAMPLE 1

The path of a soccer ball that was thrown in the air is modelled by the graph. The *y*-values represent the **height of the ball** in *metres* and the *x*-values represent the **horizontal distance** in *metres* that the ball has travelled.

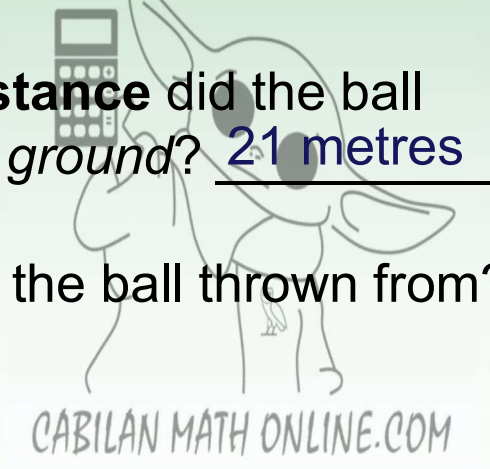


(a) What was the **maximum height** of the ball? 9 metres

(b) How far did the ball travel *horizontally* to reach this maximum height? 10 metres

(c) What **horizontal distance** did the ball travel before hitting the *ground*? 21 metres

(d) At **what height** was the ball thrown from? 1.5 metres



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EXAMPLE 2

The arched support of a bridge can be modelled by the quadratic relation $\mathbf{y = -0.024x^2 + 2.4x}$, where ***y* represents the height in feet**, and ***x* represents the horizontal distance in feet**. Vertical support posts are to be installed at various lengths from the base of the arch.

How tall should the support post be

(a) at **50 feet**

→ Substitute **x = 50** into the relation

$y = -0.024x^2 + 2.4x$

$= -0.024(50)^2 + 2.4(50)$

$= \mathbf{60\ feet}$

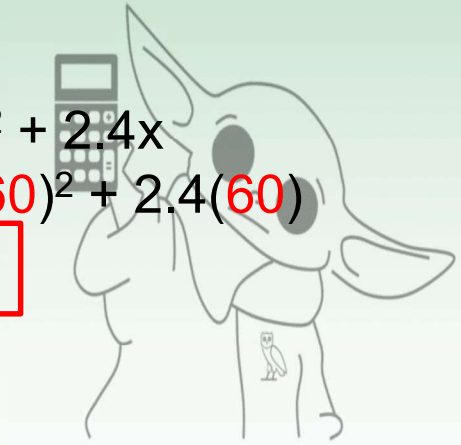
(b) at **60 feet**

→ Substitute **x = 60** into the relation

$y = -0.024x^2 + 2.4x$

$= -0.024(60)^2 + 2.4(60)$

$= \mathbf{57.6\ feet}$



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