Name _____ Date _____ Period _____

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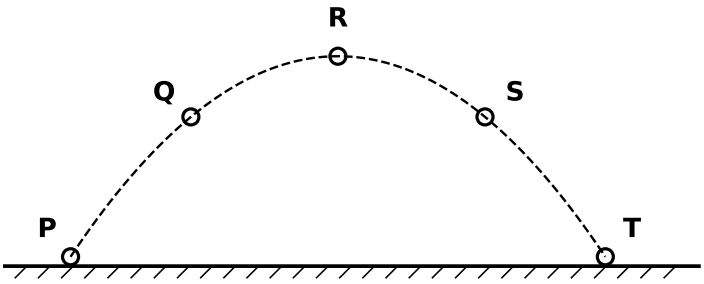
Angled Projectiles

Physics

Part A: Concepts

Ignore air resistance. The ground is level in every problem.

1. A soccer ball is kicked from P and lands at T. Points Q and S are at the same height, and R is the top of the path.



a. At which point is the vertical velocity zero? Is the ball's speed zero there? Explain.

b. What is the ball's acceleration at R (size and direction)?

c. Compare the ball's speed at Q and at S, and its speed at P and at T.

d. On the diagram, draw the horizontal and vertical velocity components at each point.

Part B: Launch Calculations

$v_x = v_i \cos\theta$, $v_{iy} = v_i \sin\theta$, $a = -9.8$ m/s^2, $v_y = 0$ at the top. Show your knowns, equation, substitution, and answer with units.

2. A long jumper leaves the ground at 9.00 m/s at 20.0° above the horizontal.

a. How long is she in the air?

b. How far does she jump?

c. Her coach says she would jump farther at a launch angle closer to 45°. Explain why.

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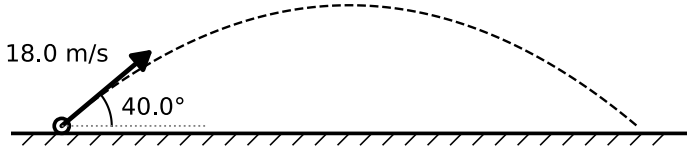
3. Diego kicks a ball from the ground at 18.0 m/s at 40.0° above the horizontal.



a. Find v_x and v_{iy}.
b. How long does the ball take to reach the top? What is its total hang time?
c. What is the ball's maximum height?
d. How far away does it land (its range)?

4. A water fountain shoots two streams at the same speed, 6.00 m/s. Stream A leaves at 60.0° and stream B leaves at 30.0° above the horizontal.

a. Find the range of stream A.
b. Without a full calculation, predict the range of stream B. Explain.
c. Which stream goes higher? Explain using v_{iy}.

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