Trip to Proxima Centauri calculations

Kinematic Equations:

1) $v_f^2 - v_0^2 = 2ax$
2) $x = 0.5at^2$

Constants:

1) $g = 9.8\ m/s^2$ (gravitational acceleration)
2) $c = 3 \times 10^8\ m/s$ (speed of light in a vacuum)
3) $D = 4.24$ light years (Distance from Earth to Proxima Centauri)

Calculations:

Distance traveled accelerating at g from rest to 0.92c

$(0.92c)^2 - (0)^2 = 2gx$

$x = (0.92c)^2 \div 2g = (0.92(3 \times 10^8\ m/s))^2 \div 2(9.8\ m/s^2) = 3.886530612 \times 10^{15}\ m =$ 0.41 light years

Time elapsed accelerating at g from rest to 0.92c

$3.886530612 \times 10^{15}\ m = 0.5gt^2$

$t^2 = (3.886530612 \times 10^{15}\ m) \div 0.5(9.8\ m/s^2)$

$t = \text{sqrt}((3.886530612 \times 10^{15}\ m) \div 0.5(9.8\ m/s^2)) = 28163265.31\ s =$ 0.89 years

Distance traveled while coasting at 0.92c

x = D – (accelerating distance) – (decelerating distance) = D - 0.41 light years -0.41 light years

= 4.24 light years – 0.41 light years – 0.41 light years = 3.42 light years

Time elapsed while coasting at 0.92c

t = 3.42 light years ÷ 0.92c = 3.72 years

Total Time Elapsed

T = (accelerating time) + (coasting time) + (decelerating time)

= 0.89 years + 3.72 years + 0.89 years = 5.5 year