Name _____ Quadratics Review

Formula for vertical motion:

1. A projectile is launched from a height of 1 foot with an initial upward velocity of 60 ft/s.

Write the function that models the path of this projectile: _____

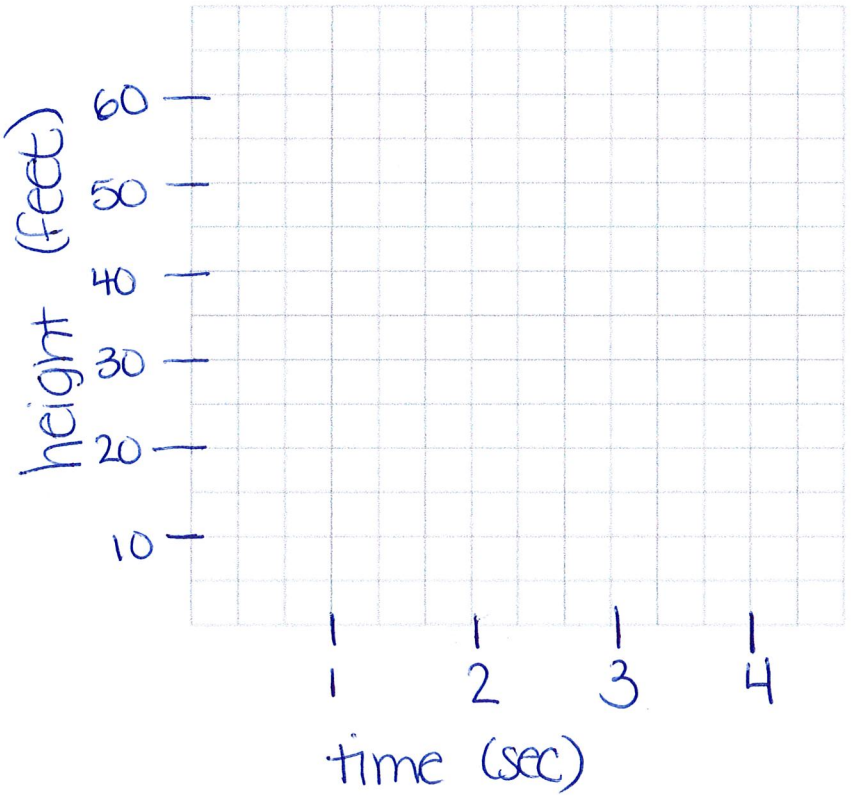
Formula:

2. **When** will the projectile reach its **maximum height**? _____
3. **What** is its **maximum height**? _____
4. Where is this on the graph?_____
5. How long is the projectile in the air? (When will it hit the ground? _____
6. Where is this on the graph? _____

Formula:

7. Will the projectile reach 55 feet? 65 feet? **Prove your answer with the discriminant!**

Formula:



t	h
0	
1	
2	
3	
4	

Solve using the quadratic formula. For #8-10 leave answers in simplest radical form. For #11-12 round to the nearest tenth.

8. $4x^2 - 12x + 9 = 0$	9. $3x^2 + 10x = -6$
10. $3x^2 - 4x + 7 = 0$	11. $3x^2 = 11x + 2$

12. A soccer ball is kicked with an initial upward velocity of 50 ft/s from a starting height of 3.5 feet.
    A. Write the vertical motion formula:
    B. How long is the ball in the air?

Find the number and the nature of the roots for each function:

13. $49x^2 + 28x + 4 = 0$	14. $6x^2 = 5x - 10$
15. $x^2 + 8 = 4x$	16. $8x^2 - 2x - 4 = 0$
17. A soccer ball is kicked and follows the path: $h = -16t^2 + 50t + 2$. Will the ball reach 40 feet? 50 feet?	
18. An apartment's rental agency uses the formula $I = 5400 + 300n - 50n^2$ to find its monthly income I based on renting n apartments. Will the agency's monthly income ever be \$7000?	

Name _____ Quadratics Review

Formula for vertical motion: $h = -16t^2 + vt + C$

1. A projectile is launched from a height of 1 foot with an initial upward velocity of 60 ft/s.

Write the function that models the path of this projectile: $h = -16t^2 + 60t + 1$

Formula: $x = \frac{-b}{2a}$

2. **When** will the projectile reach its **maximum height**? 1.875 sec
3. **What** is its **maximum height**? 57.25 feet
4. Where is this on the graph? vertex

$x = \frac{-60}{2(-16)} = \frac{-60}{-32}$

5. How long is the projectile in the air? (When will it hit the ground)? 3.77 sec

Formula: $x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$

6. Where is this on the graph? x-int

$x = \frac{-60 \pm \sqrt{60^2-4(-16)(1)}}{2(-16)}$ $\frac{-60 \pm \sqrt{3664}}{-32}$ $\frac{-60 \pm 60.53}{-32}$

$= 3.77$

7. Will the projectile reach 55 feet? 65 feet? **Prove your answer with the discriminant!**

Formula: $d = b^2 - 4ac$

$55 = -16t^2 + 60t + 1$

$0 = -16t^2 + 60t - 54$

$(60)^2 - 4(-16)(-54)$

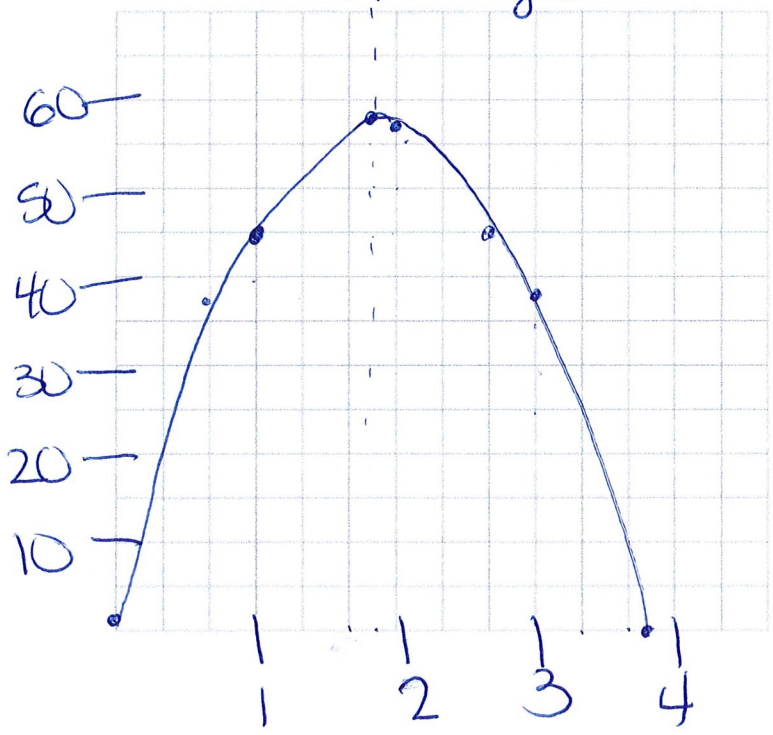
144 yes

$65 = -16t^2 + 60t + 1$

$0 = -16t^2 + 60t - 64$

$(60)^2 - 4(-16)(-64)$

-496 no



t	h
0	1
1	45
2	57
3	37
4	-15

Solve using the quadratic formula. For #8-10 leave answers in simplest radical form. For #11-12 round to the nearest tenth.

8. $4x^2 - 12x + 9 = 0$

$x = \frac{12 \pm \sqrt{(-12)^2 - 4(4)(9)}}{2(4)}$

$x = \frac{12 \pm \sqrt{0}}{8}$ $x = \frac{12}{8}$ $x = \boxed{\frac{3}{2}}$

9. $3x^2 + 10x = -6$

$3x^2 + 10x + 6 = 0$

$x = \frac{-10 \pm \sqrt{10^2 - 4(3)(6)}}{2(3)}$

$x = \frac{-10 \pm \sqrt{28}}{6}$ $\frac{-10 \pm 2\sqrt{7}}{6}$ $x = \frac{-5 \pm \sqrt{7}}{3}$

10. $3x^2 - 4x + 7 = 0$

$x = \frac{4 \pm \sqrt{(-4)^2 - 4(3)(7)}}{2(3)}$

$x = \frac{4 \pm \sqrt{-68}}{6}$ $\frac{4 \pm \sqrt{4i^2\sqrt{17}}}{6}$

$\frac{4 \pm 2i\sqrt{17}}{6}$ $x = \frac{2 \pm i\sqrt{17}}{3}$

11. $3x^2 = 11x + 2$

$3x^2 - 11x - 2 = 0$

$x = \frac{11 \pm \sqrt{(-11)^2 - 4(3)(-2)}}{2(3)}$

$x = \frac{11 \pm \sqrt{145}}{6}$ $x = \frac{11 \pm 12.04}{6}$ $x = 3.8, -.2$

12. A soccer ball is kicked with an initial upward velocity of 50 ft/s from a starting height of 3.5 feet.

A. Write the vertical motion formula: $h = -16t^2 + 50t + 3.5$

B. How long is the ball in the air?

$x = \frac{-50 \pm \sqrt{(50)^2 - 4(-16)(3.5)}}{2(-16)}$

$x = \frac{-50 \pm \sqrt{2724}}{-32}$ $x = \frac{-50 \pm 52.19}{-32}$ ~~$x = -.068$~~ $x = 3.19$

$\boxed{x = 3.2}$

Find the number and the nature of the roots for each function:

13. $49x^2 + 28x + 4 = 0$

$(28)^2 - 4(49)(4)$

0

1 Real Root

14. $6x^2 = 5x - 10$

$6x^2 - 5x + 10 = 0$

$(-5)^2 - 4(6)(10)$

-215

0 real, 2 imaginary.

15. $x^2 + 8 = 4x$

$x^2 - 4x + 8 = 0$

$(-4)^2 - 4(1)(8)$

-16

0 real, 2 imag.

16. $8x^2 - 2x - 4 = 0$

$(-2)^2 - 4(8)(-4)$

132

2 real.

17. A soccer ball is kicked and follows the path: $h = -16t^2 + 50t + 2$. Will the ball reach 40 feet? 50 feet?

$40 = -16t^2 + 50t + 2$

$0 = -16t^2 + 50t - 38$

$(50)^2 - 4(-16)(-38)$

$68 \rightarrow$ yes

$50 = -16t^2 + 50t + 2$

$0 = -16t^2 + 50t - 48$

$(50)^2 - 4(-16)(-48)$

$-572 \rightarrow$ no.

18. An apartment's rental agency uses the formula $I = 5400 + 300n - 50n^2$ to find its monthly income I based on renting n apartments. Will the agency's monthly income ever be \$7000?

$7000 = 5400 + 300n - 50n^2$

$-5400 \quad -300n \quad +50n^2$

$50n^2 - 300n + 1600 = 0$

$(-300)^2 - 4(50)(1600)$

$-230\,000$ no