Date: _____ Name: _____

Practice Quadratic Strategies

1. The flight of a baseball is modelled by $y = -4.9x^2 + 9.8x + 14.7$ where x is the time, in sec, and y is the height, in m, above the ground.
   a. What is the height of the ball 0.5 seconds after it was hit?
   b. How long does it take for the ball to reach the ground?
   c. Find the maximum height.

2. A supporting arch of a bridge can be represented by the quadratic function $y = -0.0625x^2 + 9$, where *x* is the horizontal distance (in metres) and *y* is the height of the arch (in metres).
   a. What is the vertex of this parabola?
   b. What is the maximum height of the arch?
   c. If the x-intercepts represent the beginning and the end of the arch, how wide is the base of the arch

3. A family restaurant has daily expenses that can be modelled by the quadratic relation $C = 4t^2 - 28t + 40$, where *C* represents the total cost in dollars, and *t* represents the time in hours the restaurant is open.
   a) What is the minimum cost of running the restaurant each day?
   b) What is the number of hours the restaurant is open for this minimum cost?
   c) What is the cost per day when the restaurant is not open for business?
   d) How many hours was the restaurant open if the total cost per day was $160?
   e) What is the cost per day if the restaurant is open for 8 hours?

4. The path of a skydiver can be modelled by the relation $h = -40t^2 + 6000$, where *h* represents the height of the skydiver in metres, and *t* represents time in seconds.
   a) From what height does the skydiver jump out of the plane?
   b) How long does the skydiver take to reach the ground?

5. The time taken to climb from the bottom of a canyon to the top can be modelled by the relation $d = 20t^2 - 2000$, where *d* represents the distance in metres between the climber and the top of the canyon, and *t* represents time in minutes
   a) How deep is the canyon?
   b) How long does it take a climber to reach the top?
   c) How long does it take a climber to reach the half way up the canyon?

6. Michael owns a trampoline. He wants to see how high he can jump. The path of one jump can be modelled by the relation $h = -4t^2 + 80t + 12$, where *h* represents Michael's height above the ground in centimetres and *t* represents time in seconds.
   a) What is the height of the trampoline?
   b) What is the maximum height Michael reaches?
   c) How long does it take Michael to reach this height?
   d) What is the height at 2 seconds?
   e) How long would it take for Michael to reach a height of 348 cm?

7. A textbook falls from the top shelf of a shaky bookcase. The path of the book can be modelled by the relation $h = -9t^2 + 90$, where *h* represents the height of the book above the floor, in centimetres, and *t* represents time in seconds.
   a) What is the height of the top shelf?
   b) How long does it take the book to reach the floor?

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ANSWERS

1 @ 18.375 m

(b) $\frac{-9.8 \pm \sqrt{9.8^2 - 4(-4.9)(14.7)}}{2(-4.9)}$ = ~~-1~~ or 3 sec

(c) 19.6 m

2 @ (0, 9)

(b) 9 m

(c) +12 and -12 ∴ 24 m width

3 @ $9 ie. at minimum MAKE $9 /day

(b) 3.5 hrs/day

(c) $40

(d) 10 hrs

(e) $72

4 @ 6000 m

(b) 12.2 sec

5 @ -2000 m or 2000 deep

(b) 10 min

(c) 7.1 ~~sec~~ min

6 @ 12 cm

(b) ~~[illegible]~~ cm 412 cm

(c) ~~[illegible]~~ sec 10 sec

(d) 156 cm

(e) 6 sec on the way up
14 sec on the way down

7 @ 90 cm

(b) 3.2 sec