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Manipulating quadratic and exponential expressions

1.The equation below can be used to calculate the kinetic energy, K, of an object having a mass, m, and a velocity, v.

$K=\frac{1}{2}mv^2$

If the velocity of Niklas's car slows to $\frac{2}{3}$ of its previous velocity, what will be the effect on the kinetic energy of the car?

A. The kinetic energy will become $\frac{2}{3}$ of the previous amount.

B. The kinetic energy will become $\frac{4}{9}$ of the previous amount.

C. The kinetic energy will become $\frac{1}{3}$ of the previous amount.

D. The kinetic energy will become $\frac{1}{9}$ of the previous amount.

2.The "hang time" of a football is the amount of time the football stays in the air after being kicked. The height, in meters, of the football above the ground at time t can be modeled by the quadratic function:
h(t)=−4.9t2+19.6t
Which of the following equivalent expressions displays the hang time of the football as a constant or coefficient?

A. −4.9(t−2)2+19.6
B. −4.9t(t−4)
C. −4.9(t−3)2−9.8t+44.1
D. −4.9(t−1)2+9.8t+4.9

3.Ariel was playing baseball and hit the ball into the air with a baseball bat. The height, h, in feet, of the ball t seconds after it left her bat is modeled by the equation below:

$h(t) = -16t^2 + 64t + 4$

How many seconds after leaving Ariel's bat does the ball reach its maximum height?

A. 2 seconds
B. 4 seconds
C. 8 seconds
D. 16 seconds

4.The height, h, in feet, of a baseball t seconds after Tobin hit it with a baseball bat can be modeled by the equation below:
$h(t) = -16t2+64t+4$
Which of the following equivalent expressions displays the value of the baseball's maximum height as a constant or coefficient?

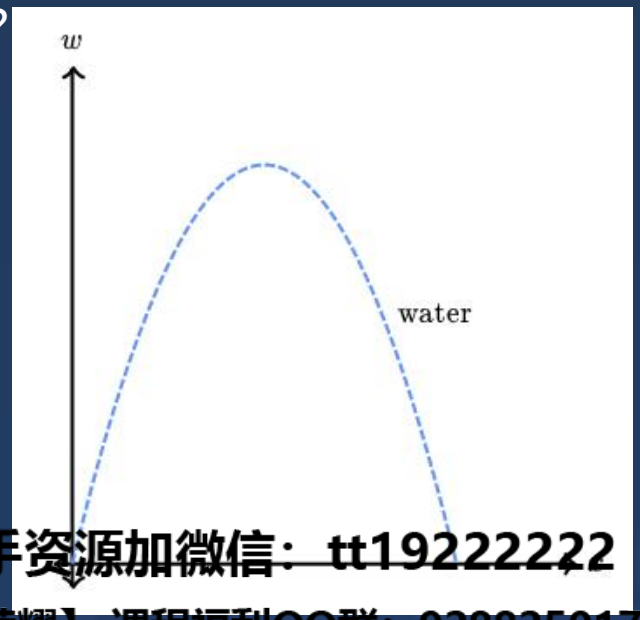
A. $-16(t-2)2+68$
B. $-4t(4t-16)+4$
C. $-16(t2-4t-41)$
D. $-16(t2-4t)+4$

5.A water fountain creates a thin arc of water in the shape of a parabola. The path of the water coming from the fountain can be modeled by the quadratic equation

$w(x)=-0.022x2+0.84x$

where x is the distance, in feet, from the water source in the direction of the arc and w(x) is the height of the water, in feet.

Which of the following approximately equivalent expressions shows the maximum height of the water?



A. $-0.022x(x-38)$
B. $-0.022(x^2-38x)$
C. $-0.022(x-19)^2+7.9$
D. $-0.022((x-18)^2-2x-324)$

6.Chang is measuring the speeds of stars as they travel around a black hole. She notices that the speed, s, in kilometers per second t days after March 1st is given by:

$s(t)=100+30t-(t-2)2$

Which of the following expressions for the star's speed is equivalent to the expression above and contains the maximum speed of the star as a constant or coefficient?

A. $96+34t-t2$

B. $-(t-17)2+385$

C. $-(t-34)2+385$

D. $104+30t-t2$

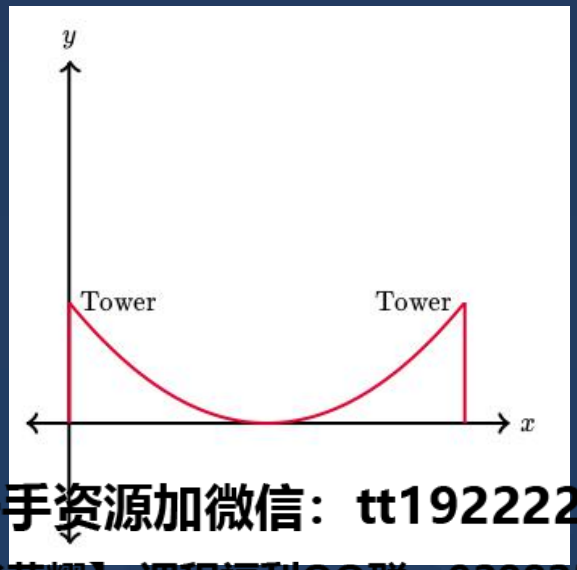
7.The Golden Gate Bridge is a suspension bridge that consists of two cables hung from two towers of equal height that are approximately 1280m apart. The height of the cable above the ground, in meters, can be modeled by the quadratic function

h(x)=0.000371(x−640)2

where x is the distance in meters measured from the left tower.

Which of the following approximately equivalent expressions displays the height of the tower as a constant or coefficient?

A.$0.000371x^2-0.47488x+151.9616$
B.$0.000371(x^2-1280x+409{,}600)$
C.$0.000371((x-600)^2-80x+49{,}600)$
D.$0.000371((x-650)^2+20x-12{,}900)$



8.A small business models its weekly revenue (the product of the number of units sold and the price per unit) by the quadratic function
$R(x)=50x-0.1x2$
where x is the number of units sold.
What is the maximum weekly revenue of the business?

A. $625
B. $6,250
C. $25,000
D. $62,500

9.The path of an atom where x is the east coordinate in millimeters and y is the north coordinate in millimeters from a sensor is:
x=y2− 4y+5
Among all points along the atom's path, what is the smallest east coordinate in millimeters?

10.An electronics company has modeled its profits, in dollars, from the sale of smartphones by the quadratic function
$P(x) = -0.05x2 + 1,000x$
where x is the number of units sold.
Which of the following equivalent expressions displays the number of units that must be sold to maximize profit as a constant or coefficient?

A. $-0.05(x2-20,000x)$
B. $-0.05(x-10,000)2+5,000,000$
C. $-0.05x(x-20,000)$
D. $-0.05(x2-5,000x)+750x$

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Thanks

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