2018
7th Annual
Tenacity Challenge Quiz

You will leave with a paper copy of today's questions.

If you have questions/comments,
Email: patrick_morrissey@bedfordps.org

Question #1 2.5 points 60 Seconds

When four given numbers are multiplied together, the product is negative. Which of the following could be true about the four numbers?

(A) One is negative, two are positive, and one is zero.
(B) Two are negative, one is positive, and one is zero.
(C) Two are negative and two are positive.
(D) Three are negative and one is positive.
(E) Four are negative.

Question #1

Answer: D

2.5 points

Question #2 5 points 90 Seconds

The function g, where $g(t) = 0.066t + 0.96$, can be used to represent the relation between grade point average $g(t)$ and the number of hours t spent studying each week. Based on this function, a student with a grade point average of 3.5 studied how many hours per week?

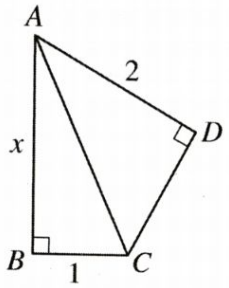
(A) 0.96
(B) 1.2
(C) 14.5
(D) 38.5
(E) 67.8

Question #2

Answer: D

5 points

Question #3 5 points 120 Seconds



In the figure above, if $\triangle ABC$ and $\triangle ADC$ are right triangles, then $CD =$

(A) $\sqrt{x^2 - 3}$

(B) $\sqrt{x^2 + 1}$

(C) $\sqrt{x^2 + 1} + 2$

(D) $\sqrt{x^2 + 3}$

(E) $x^2 + 5$

Question #3

Answer: A

5 points

Question #4 2.5 points 60 Seconds

$$v = -9.8t + 30$$

An object is launched upward. The equation above models the velocity v, in meters per second, of the object t seconds after being launched. In the equation, what does the number 30 represent?

A. The initial height, in meters, of the object

B. The initial velocity, in meters per second, of the object

C. The change in the velocity, in meters per second, of the object t seconds after being launched

D. The change in the velocity, in meters per second, of the object each second after being launched

Question #4

Answer: B

2.5 points

Question # 5 10 points 180 Seconds

One equation in a system of equations is $y = 9x^2$. The second equation, when graphed in the *xy*-plane, is a horizontal line that passes through the point $\left(-\frac{1}{3}, 4\right)$.

What is the value of x^2 for both of the solutions to the system of equations?

A. $\frac{1}{9}$

B. $\frac{16}{81}$

C. $\frac{4}{9}$

D. $\frac{2}{3}$

Question #5

Answer: C

points

Question #6 5 points 90 Seconds

The resale value of a car is expected to decrease by 15 percent from one year to the next from the year the car is purchased. What type of relationship should be expected between the age of a car and the resale value?

A. Linear relationship whose graph has a positive slope

B. Linear relationship whose graph has a negative slope

C. Quadratic relationship in which higher resale values of a car correspond to lower age values of the car

D. Exponential relationship in which lower resale values of a car correspond to higher age values of the car

Question #6

Answer: D

5 points

Question #7 10 points 180 Seconds

Martin spent $855 on expenses for a trip. The expenses included hotel, rental car, and meals. He spent 50 percent more for the hotel than for the rental car and meals combined. What did Martin spend on his hotel?

A. $570

B. $513

C. $214

D. $155

Question #7

Answer: B

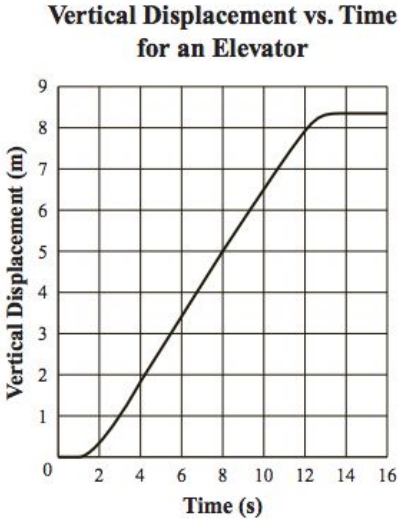
10 points

Question #8

2.5 points

60 Seconds

The graph below represents the vertical displacement of an elevator during a 16 s period.



Which of the following can be concluded from the data in the graph?

A. Between 2 s and 6 s, the acceleration of the elevator is greatest.

B. Between 4 s and 12 s, the velocity of the elevator is constant.

C. Between 8 s and 14 s, the acceleration of the elevator is constant.

D. Between 14 s and 16 s, the velocity of the elevator is greatest.

Question # 8

Answer: B

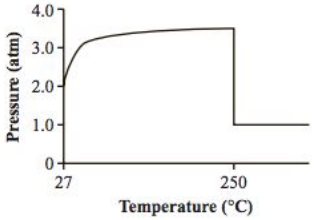
2.5 points

Question #9 5 points 120 Seconds

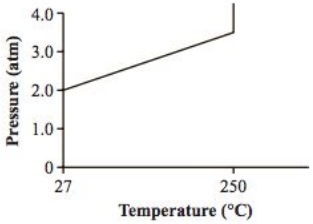
Some manufacturers place rubber plugs in the bottoms of pressurized aerosol cans to prevent structural failure if the cans are exposed to excessive heat. The normal pressure inside an aerosol can is 2.0 atm at 27°C. When the temperature of the gas in the can is increased to 250°C, the pressure reaches 3.5 atm and the plug pops out.

Which of the following graphs **best** shows the relationship of pressure to the temperature inside the can?

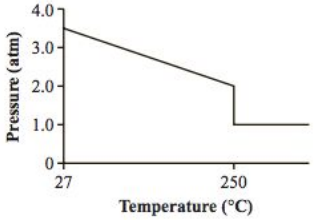
A.



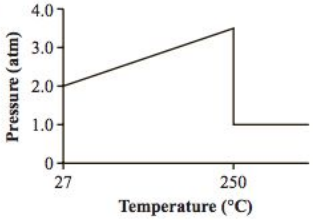
C.



B.



D.



Question #9

Answer: D

5 points

Question #10 2.5 points 60 Seconds

When a sample of a gas is cooled, it condenses into a liquid. In which of the following ways do the molecules of the original gas sample compare with the molecules of the liquid?

A. The molecules are larger as a gas than they are as a liquid.

B. The molecules weigh less as a gas than they do as a liquid.

C. The molecules move faster as a gas than they do as a liquid.

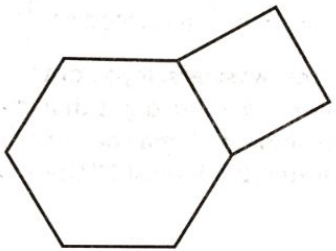
D. The molecules are closer together as a gas than they are as a liquid.

Question # 10

Answer: C

2.5 points

Question #11 10 points 180 Seconds



The figure above shows a regular hexagon with sides of length a and a square with sides of length a. If the area of the hexagon is $384\sqrt{3}$ square inches, what is the area, in square inches, of the square?

A) 256

B) 192

C) $64\sqrt{3}$

D) $16\sqrt{3}$

Question #11

Answer: A

10 points

Question #12

5 points

120 Seconds

Percent of Residents Who Earned a Bachelor's Degree or Higher

State	Percent of residents
State A	21.9%
State B	27.9%
State C	25.9%
State D	19.5%
State E	30.1%
State F	36.4%
State G	35.5%

A survey was given to residents of all 50 states asking if they had earned a bachelor's degree or higher. The results from 7 of the states are given in the table above. The median percent of residents who earned a bachelor's degree or higher for all 50 states was 26.95%. What is the difference between the median percent of residents who earned a bachelor's degree or higher for these 7 states and the median for all 50 states?

A) 0.05%
B) 0.95%
C) 1.22%
D) 7.45%

Question #12

Answer: B

5 points

Question #13 10 points 180 Seconds

The *pes*, a Roman measure of length, is approximately equal to 11.65 inches. It is also equivalent to 16 smaller Roman units called digits. Based on these relationships, 75 Roman digits is equivalent to how many feet, to the nearest hundredth? (12 inches = 1 foot)

Question # 13

Answer: 4.55

10 points

Question #14 5 points 120 Seconds

Population of Greenleaf, Idaho

Year	Population
2000	862
2010	846

The table above shows the population of Greenleaf, Idaho, for the years 2000 and 2010. If the relationship between population and year is linear, which of the following functions P models the population of Greenleaf t years after 2000?

A) $P(t) = 862 - 1.6t$

B) $P(t) = 862 - 16t$

C) $P(t) = 862 + 16(t - 2{,}000)$

D) $P(t) = 862 - 1.6(t - 2{,}000)$

Question #14

Answer: A

5 points

Question #15 10 points 180 Seconds

EXAMPLE

What is the sum of all the constants k such that the two lines

$$(k+1)x - 3y + 2 = 0, \quad (k-2)x + 4y - 1 = 0$$

are perpendicular to each other?

Question #15

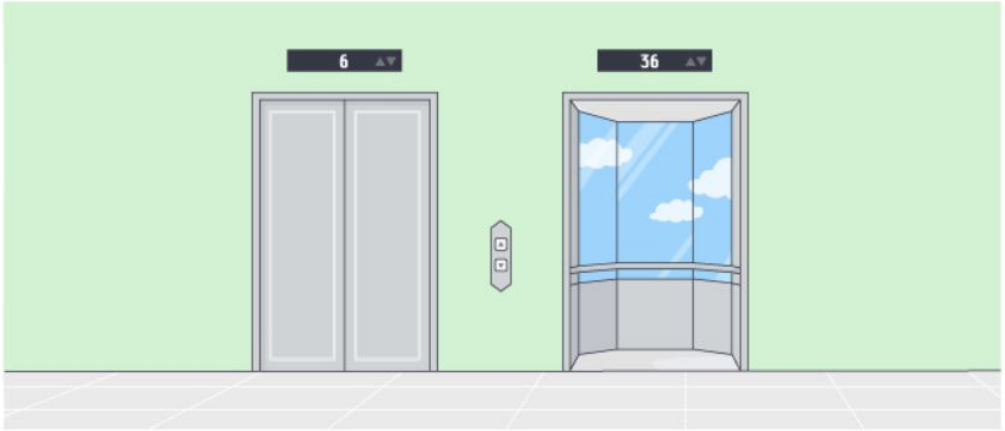
Answer: 1

10 points

Question #16 10 points 180 Seconds

The Elevator

In this 36-story building it takes 6 seconds to get from the 1st floor to the 6th floor by elevator. In the same elevator, how long does it take to go from the 1st floor to the 36th floor? The elevator always moves at a constant speed.



Question #16

Answer: 42 seconds

10 points

Tiebreaker #1 NO CALCULATOR

14. If t is a negative number, which of the following must be a positive number?

(A) $10 - t$

(B) $t - 3$

(C) $t + 5$

(D) $2t$

(E) $\frac{-t}{-2}$

Tiebreaker #1 NO CALCULATOR

Answer: A

Tiebreaker #2 NO CALCULATOR

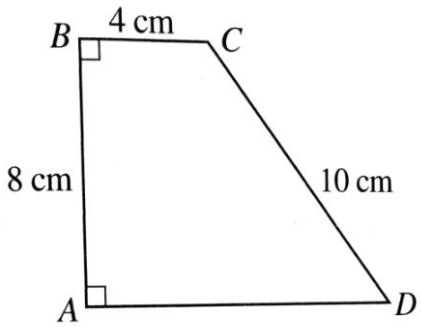
$$0, 1, 5, 14, 30, \ldots$$

The sequence above starts with 0 and the numbers increase by the squares of consecutive integers. What is the 6th number in the sequence?

Tiebreaker #2 NO CALCULATOR

Answer: 55

Tiebreaker #3 NO CALCULATOR

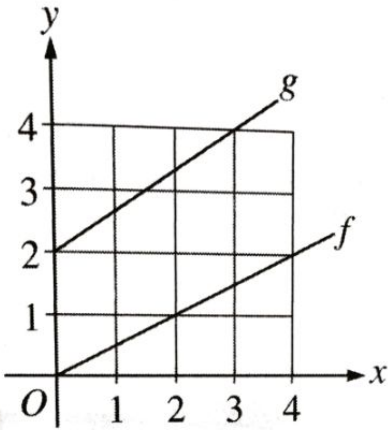


3. What is the area of quadrilateral $ABCD$ in the figure above?

Tiebreaker #3 NO CALCULATOR

Answer: 56

Tiebreaker #4 NO CALCULATOR



3. The figure above shows the graphs of linear functions f and g. What is the value of $f(3) + g(3)$?

Tiebreaker #4 NO CALCULATOR

Answer: 5.5

Tiebreaker #5 NO CALCULATOR

Let d and e denote the solutions of $2x^2 + 3x - 5 = 0$. What is the value of $(d-1)(e-1)$?

Tiebreaker #5 NO CALCULATOR

Answer: 0

Sudden Death #1 NO CALCULATOR

Simplify

$$\sqrt[3]{x\sqrt[3]{x\sqrt[3]{x\sqrt{x}}}}.$$

(A) $\sqrt{x}$ (B) $\sqrt[3]{x^2}$ (C) $\sqrt[27]{x^2}$ (D) $\sqrt[54]{x}$ (E) $\sqrt[81]{x^{80}}$

Sudden Death #1 NO CALCULATOR

Answer: A

Sudden Death #2 NO CALCULATOR

The sum of three numbers is 20. The first is four times the sum of the other two. The second is seven times the third. What is the product of all three?

Sudden Death #2 NO CALCULATOR

Answer: 28

Sudden Death #3 NO CALCULATOR

What is

$$\frac{2+4+6}{1+3+5} - \frac{1+3+5}{2+4+6}$$

Simplify the fraction completely. No Decimals

Sudden Death #3 NO CALCULATOR

Answer: 7/12 only.

Sudden Death #4 NO CALCULATOR

Real numbers a and b satisfy the equations $3^a = 81^{b+2}$ and $125^b = 5^{a-3}$. What is ab?

Sudden Death #4 NO CALCULATOR

Answer: 60

Sudden #5

A basketball team's players were successful on 50% of their two-point shots and 40% of their three-point shots, which resulted in 54 points. They attempted 50% more two-point shots than three-point shots. How many three-point shots did they attempt?

Sudden #5

Answer: 20 threes