

2019 Tenacity Challenge Quiz Bowl

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

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





2019 Tenacity Challenge Quiz Bowl

Question #1

2.5 points

60 Seconds

$$7x + 3y = 8$$

$$6x - 3y = 5$$

For the solution (x, y) to the system of equations above, what is the value of $x - y$?

A) $-\frac{4}{3}$

B) $\frac{2}{3}$

C) $\frac{4}{3}$

D) $\frac{22}{3}$



Question #1

Answer: B

2.5 points



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Question #2

5 points

90 Seconds

Liliane has 50% more soda than Jacqueline, and Alice has 25% more soda than Jacqueline. What is the relationship between the amounts of soda that Liliane and Alica have?

- (A) Liliane has 20% more soda than Alice.
- (B) Liliane has 25% more soda than Alice.
- (C) Liliane has 45% more soda than Alice.
- (D) Liliane has 75% more soda than Alice.
- (E) Liliane has 100% more soda than Alice.



Question #2

Answer: A

5 points



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Question #3

10 points

150 Seconds

There are two values of a for which the equation $4x^2 + ax + 8x + 9 = 0$ has only one solution for x . What is the sum of those values of a ?

- (A) -16 (B) -8 (C) 0 (D) 8 (E) 20



Question #3

Answer: A

10 points

A photocopy machine is initially loaded with 5,000 sheets of paper. The machine starts a large job and copies at a constant rate. After 20 minutes, it has used 30% of the paper. Which of the following equations models the number of sheets of paper, p , remaining in the machine m minutes after the machine started printing?

A) $p = 5,000 - 20m$

B) $p = 5,000 - 75m$

C) $p = 5,000(0.3)^{\frac{m}{20}}$

D) $p = 5,000(0.7)^{\frac{m}{20}}$

Question #4

2.5 points

60 Seconds



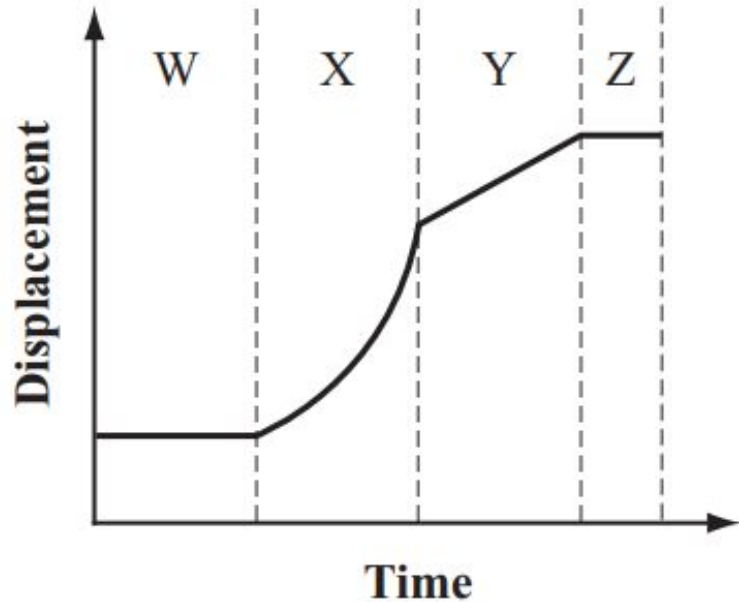
Question #4

Answer: B

2.5 points

The graph below represents an object's motion over four time intervals: W, X, Y, and Z.

Displacement vs. Time



Question #5

2.5 points
60 Seconds

During which time interval does the object move with constant, positive velocity?

- A. interval W
- B. interval X
- C. interval Y
- D. interval Z



Question #5

Answer: C

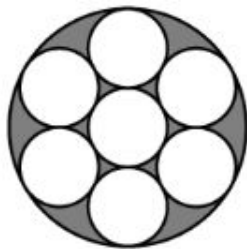
2.5 points

Question #6

10 points

150 Seconds

Each of the small circles in the figure has radius one. The innermost circle is tangent to the six circles that surround it, and each of those circles is tangent to the large circle and to its small-circle neighbors. Find the area of the shaded region.



- (A) π (B) 1.5π (C) 2π (D) 3π (E) 3.5π



Question #6

Answer: C

10 points



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Question #7

2.5 points

60 Seconds

There are two atoms of hydrogen and one atom of oxygen in one molecule of water. How many atoms of hydrogen are there in 51 molecules of water?



Question #7

Answer: 102 atoms

2.5 points



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Question #8

2.5 points

30 Seconds

Which of the following is an example of gravitational potential energy being converted to kinetic energy?

- A. A bike accelerates along a flat roadway.
- B. A bike slows down while going up a hill.
- C. A bike comes to a stop along a flat roadway.
- D. A bike starts from rest and rolls down a hill.



Question #8

Answer: D

2.5 points



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Question #9

10 points

180 Seconds

In square $ABCD$, E and F are midpoints of \overline{BC} and \overline{CD} , respectively, and the area of $\triangle AEF$ is R square units. Find the area of square $ABCD$ as a simplified expression in terms of R .



Question #9

Answer: $Area = \frac{8}{3}R$

10 points



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Question #10

10 points

180 Seconds

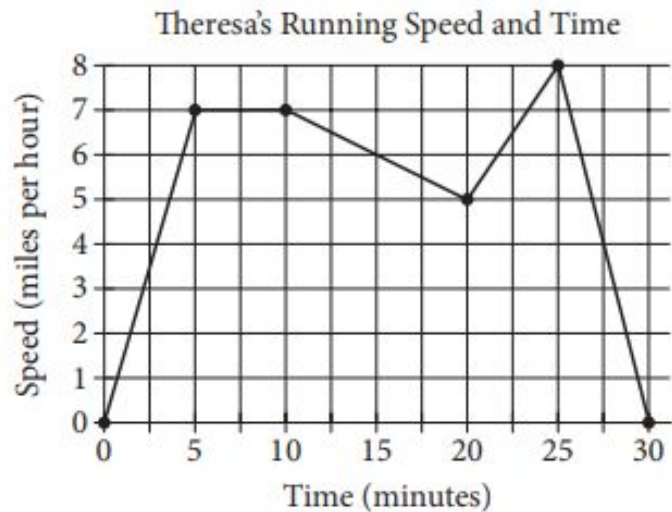
The volume of a right circular cylinder is 48π and the circumference of the base is 8π . Find the total surface area in terms of π .



Question #10

Answer: 56π **Exact answer only.**

10 points



Question #11
5 points
90 Seconds

Theresa ran on a treadmill for thirty minutes, and her time and speed are shown on the graph above. According to the graph, which of the following statements is NOT true concerning Theresa's run?

- A) Theresa ran at a constant speed for five minutes.
- B) Theresa's speed was increasing for a longer period of time than it was decreasing.
- C) Theresa's speed decreased at a constant rate during the last five minutes.
- D) Theresa's speed reached its maximum during the last ten minutes.



Question # 11

Answer: B

5 points

Question #12

5 points

90 Seconds

The white pigment in many paints is titanium dioxide (TiO_2). It is made by burning titanium(IV) chloride. The other product in this reaction is chlorine gas.

What is the balanced equation for this reaction?

- A. $\text{TiCl}_4 + \text{O}_2 \rightarrow \text{TiO}_2 + 2\text{Cl}_2$
- B. $2\text{TiCl}_4 + \text{O}_2 \rightarrow \text{TiO}_2 + 4\text{Cl}$
- C. $\text{TiCl}_4 + 2\text{O}_2 \rightarrow 2\text{TiO}_2 + \text{Cl}_2$
- D. $2\text{TiCl}_4 + 2\text{O}_2 \rightarrow 2\text{TiO}_2 + \text{Cl}_4$



Question #12

Answer: A

5 points



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Question # 13

10 points

150 Seconds

Malcolm tosses a coin four times. Determine the probability that he gets at least as many heads as tails. Write your answer as a simplified fraction.



Question # 13

Answer: $\frac{11}{16}$

10 points

Question # 14

2.5 points

30 Seconds

$$ax^3 + bx^2 + cx + d = 0$$

In the equation above, a , b , c , and d are constants.

If the equation has roots -1 , -3 , and 5 , which of the following is a factor of $ax^3 + bx^2 + cx + d$?

- A) $x - 1$
- B) $x + 1$
- C) $x - 3$
- D) $x + 5$



Question # 14

Answer: B

2.5 points



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Question #15

10 points

150 Seconds

$y = f(x)$ defines a linear function with slope of $\frac{2}{3}$ and a y -intercept of -6 .

$y = g(x)$ defines a linear function perpendicular to $y = f(x)$ with a y -intercept of $+6$.

Compute the x -intercepts of $y = h(x)$, given $h(x) = f(x) \cdot g(x)$.

Note: You must provide both answers for credit.



Question #15

Answer: 4 and 9

Need both for credit.

10 points



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Question #16

2.5 points

60 Seconds

**Find the range R and median M of the following set of data:
8,12,10,6,6,0,20,24.**

Find R/M as a simplified improper fraction.



Question #16

Answer: $\frac{R}{M} = \frac{8}{3}$

2.5 points

2019 Tenacity Challenge Quiz Bowl

Thank you all teams for competing in this year's quiz bowl. Questions come from MCAS, SAT/College Board, AMC10, Mu Alpha Theta, and the Massachusetts Math League.

I hope you enjoyed the event!

Patrick Morrissey
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