

Algebra 2 quick quiz 04172023

Question 1.

At noon, a tank contains 100 gallons of water. The table shows the input and output of water for pipes A, B, and C. The pipes begin operating simultaneously at noon.

Pipe	A	B	C
Flow in (gallons per minute)	$a(x) = 25x$	$b(x) = 10x$	
Flow out (gallons per minute)			$c(x) = 30x$

Let $T(x)$ represent the amount of water in the tank x minutes after all of pipes A, B, and C are opened. Which function represents $T(x)$?

- A. $T(x) = 100 + a(x) + b(x) + c(x)$
- B. $T(x) = a(x) + b(x) - c(x)$
- C. $T(x) = 100 + a(x) + b(x) - c(x)$
- D. $T(x) = a(x) + b(x) + c(x)$

Question 2.

The amount of a radioactive element left after a certain number of hours can be determined by the function $A(t) = A_0(1 - p)^t$ where A_0 is the initial amount of the element, t is the time in hours, and $0 < p < 1$.

Part A

What is the meaning of $1 - p$ in terms of the context?

Part B

After 2 hours, 36% of a certain element remains. If a sample has an initial amount of 100 grams, how many hours will it take until only 1 gram remains? Provide an answer supported by valid mathematical reasoning and/or calculations.

Enter your answer and your support in the space provided.

Question 3.

A school principal wants to know how far students travel in the morning to arrive at school. The principal interviews the first 40 students that arrive at school on two randomly selected days. The principal then calculates the average distance traveled.

- Explain whether this situation is an observational study or an experiment.
- Explain why the principal's randomization process may not give accurate data.
- Explain how the principal's randomization process can be improved and why the improvements would give more accurate data.

Enter your explanations in the space provided.

Question 4.

Town A has a population size of 4,000 and is predicted to increase in size by 8% each year. Town B has a population size of 5,000 and is predicted to increase in size by 6% each year.

Part A

Which statement **best** compares the size of the populations of the towns in 5 years?

- A. The size of the population in Town A will be greater than that of Town B with a difference less than 1,000 people.
- B. The size of the population in Town A will be greater than that of Town B with a difference greater than 1,000 people.
- C. The size of the population in Town B will be greater than that of Town A with a difference less than 1,000 people.
- D. The size of the population in Town B will be greater than that of Town A with a difference greater than 1,000 people.

Part B

If the predictions are correct, the two populations will be equal in size at some point in time. To the nearest person, which is the **best** estimate of the size of each population at the point in time when they are equal?

- A. 8,636 people
- B. 9,919 people
- C. 10,025 people
- D. 10,878 people

Question 5.

Consider these functions:

$$g(n) = \frac{1}{2}n - 4$$

$$f(x) = g(n)x^2 + 2(g(n))x$$

$$n \neq 8$$

Part A

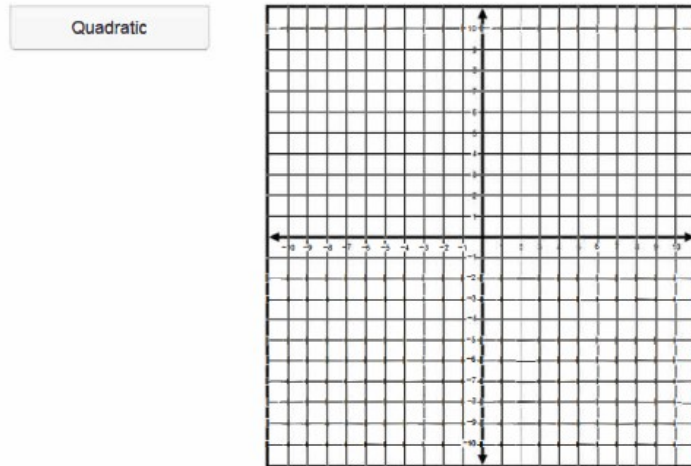
Determine the zeros of $f(x)$ when $n = 2$.

Explain how the value of n affects the zeros of $f(x)$. Support your answer with an algebraic statement.

Enter your answer and your explanation in the space provided.

Part B

The graph may be used to graph a quadratic function of the form $f(x) = ax^2 + bx + c$. Drag the vertex and another point to graph the function. The graph may be used to help answer the next question and will not be scored.



Determine the values of n for which $f(x)$ has a maximum value. Provide an answer supported by valid mathematical reasoning and/or calculations using the information about the graph of $f(x)$.

Enter your answer and your justification in the space provided.

Question 6.

A researcher wants to study the relationship between the type of sport and the type of injury in student athletes from a certain high school. Of the 345 student athletes in the school who have had injuries, 100 agreed to participate in the study and will give the researcher legal permission to view their records of sports injuries. From the records, the researcher will record the sport and the type of injury.

Part A

Which option **best** describes the type of investigation the researcher is conducting and the type of conclusion that the researcher will **most likely** be able to determine?

- A. an observational study and a causal relationship
- B. an observational study and a level of association
- C. an experiment and a causal relationship
- D. an experiment and a level of association

Part B

What is the largest group of students to which the results of the study can be generalized?

- A. all students in the school
- B. all student athletes in the school
- C. the 345 athletes who have had injuries
- D. the 100 athletes who agreed to participate in the study

Question 7.

Rewrite $(\sqrt[3]{8})^{\frac{3}{2}}(\sqrt[4]{256})^{\frac{3}{4}}$ as a whole number.

Enter your answer in the box.

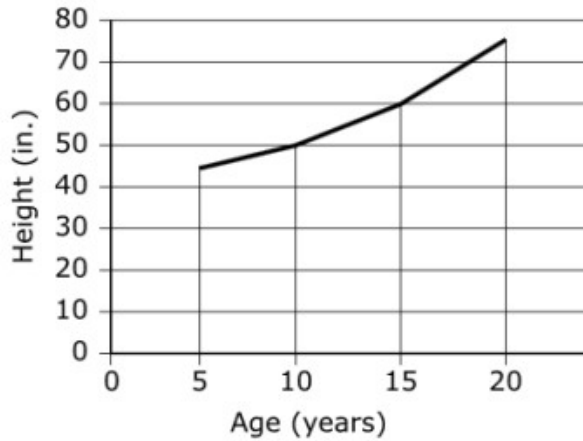
Question 8.

When the angle θ is in standard position in the xy -coordinate plane, the terminal side of the angle lies in Quadrant I. If $\sin \theta = \frac{3}{5}$, what is $\tan \theta$?

Enter your answer as a fraction in the space provided. Enter **only** your answer.

Question 9.

The graph represents the height, in inches (in.), of a boy from age 5 to age 20.



Select the correct number and phrase to complete the statements.

Between the ages of 5 and 20, the boy's height increased at an average of inches per year. The fastest increase in height occurred from

- age 5 to age 10
- age 10 to age 15
- age 15 to age 20

Question 10.

Given: $y = f(x) = |x - 3|$

and $y = g(x) = x^2 - 5x + 6$

At what points do $f(x)$ and $g(x)$ intersect?

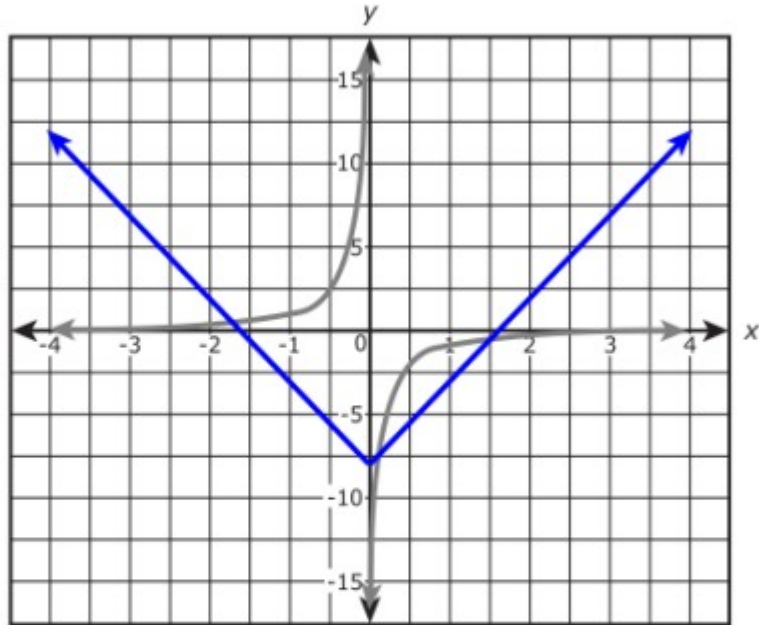
Select all that apply.

- A. $(-3, 6)$
- B. $(-1, 4)$
- C. $(1, 2)$
- D. $(1, 4)$
- E. $(3, 0)$

Bonus Question

Question 11a.

The graph of the system $\begin{cases} y = |5x| - 8 \\ y = -x^{-1} \end{cases}$ is shown.



Shown are several ordered pairs that could be solutions to the system.

Drag and drop each correct solution into the box.

(0.14, -7.32) (0.14, 7.32) (-1.46, -0.68)

(1.46, -0.68) (-0.14, -7.32) (-1.72, 0.58)

Question 11b.

The rational expression $\frac{x^3-4x^2+6}{x^2+2x}$ can be written as $ax + b + \frac{cx+d}{x^2+2x}$,
where a , b , c , and d are constants.

What are the values of c and d ?

Enter your answers in the boxes.

$c =$

$d =$