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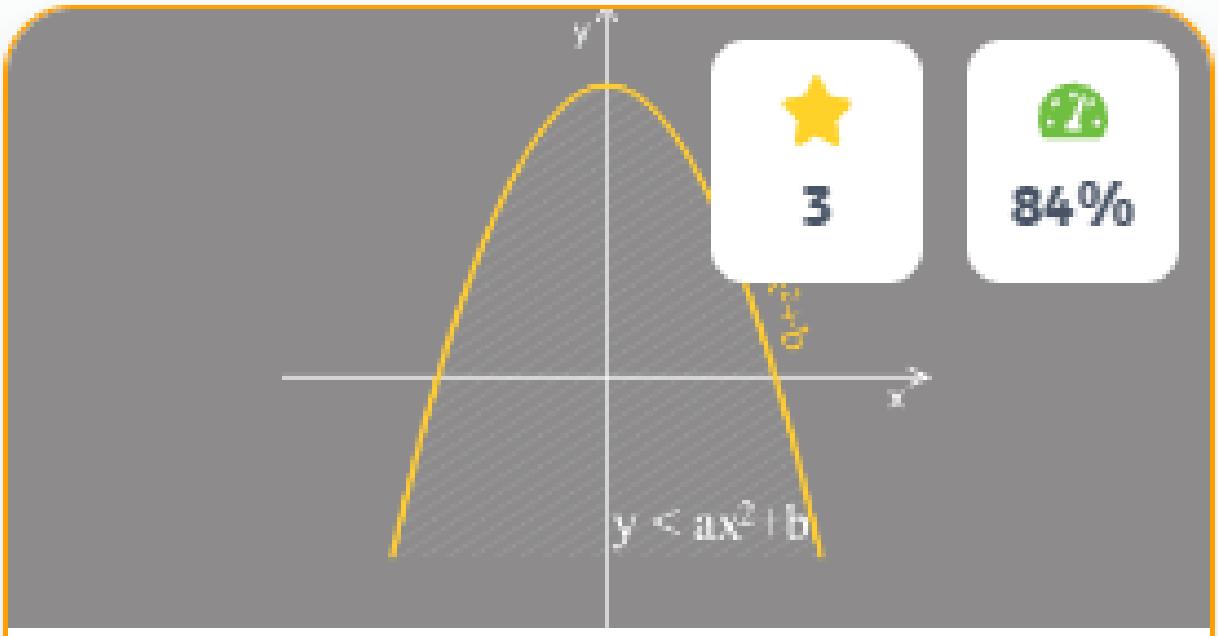


Quadratic Functions and Relations

16. Solving Quadratic Inequalities

Lesson

Review

View hints View feedback Play All

QUESTION 1



Amina and her classmates built a model rocket for their science exhibition. The path of the rocket is modeled by the function

$h(t) = -16t^2 + 32t$

where

$h(t)$

is the height of the rocket above the ground (in meters)

t

seconds after it is launched. For what time interval (rounded to the hundredth) will the rocket be at a height of at least 10 meters?

- $t \geq 1.61$
- $0.39 \leq t \leq 1.61$ ✓
- $0.39 < t < 1.61$
- $t > 1.61$

QUESTION 2

Jassim plays basketball for his school team. He throws a ball into the air. The function

$h(t) = -16t^2 + 9t + 1.2$

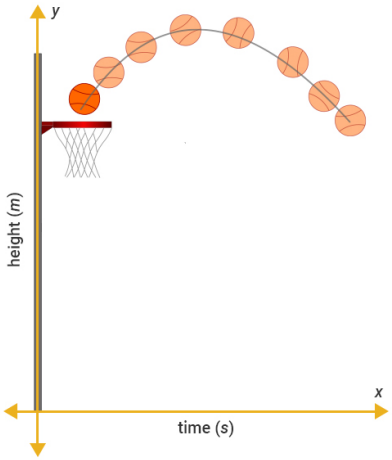
models the height,

$h(t)$

in meters of the ball after

t

seconds. The height the ball reached was not less than 2.5 meters. Select the related quadratic equation you must solve to find the roots of the inequality.



- $-16t^2+9t-1.3 \geq 0$
- $-16t^2+9t+3.7 \geq 0$
- $-16t^2+9t-1.3 = 0$ ✓
- $-16t^2+9t+3.7 = 0$

QUESTION 3

Solve by graphing to find the solution set of the quadratic inequality

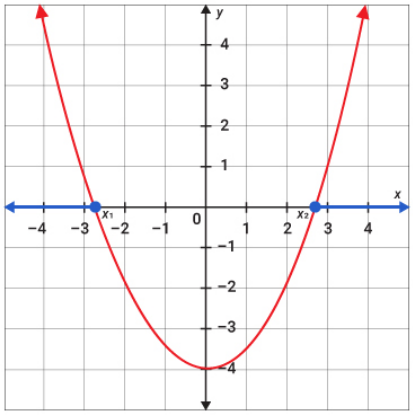
$5x^2-5x-2>2$

.

- $(-\infty,-0.52)\cup(1.52,\infty)$ ✓
- $[1.52,-0.52]$
- $(-0.52,1.52)$
- $(0.52,-1.52)$

QUESTION 4

Given the graph, which of the below statements is true?



$ax^2 + bx + c > 0$
, where
$a > 0$

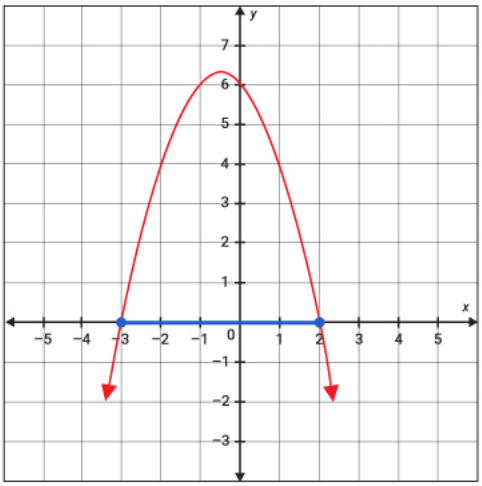
$ax^2 + bx + c \geq 0$
, where
$a > 0$

$ax^2 + bx + c \geq 0$
, where
$a < 0$

$ax^2 + bx + c \leq 0$
, where
$a > 0$

QUESTION 5

Find the solution set represented by this graph.



- ○ $\{x|-3<x<2\}$
- ○ $\{x|x\leq -3 \text{ or } x\geq 2\}$
- ○ $\{x|x<-3 \text{ or } x>2\}$
- ✓ $\{x|-3\leq x\leq 2\}$

QUESTION 6

Solve the inequality

$x^2-x-12<0$

by graphing and select the correct solution set.

- ○ $[-3,4]$
- ○ $(-\infty,-3]\cup[4,\infty)$
- ✓ $(-3,4)$
- ○ $(-\infty,-3)\cup(4,\infty)$

QUESTION 7

On solving the quadratic inequality

$4x^2 + 10x - 1 \geq 0$

by graphing, the solution set found is

$\{x|$ $x \leq -2.6$ *or* $x \geq 0.1$ $\}$ or $(-\infty, -2.6] \cup [0.1, \infty)$.

$-2.6 \leq x \leq 0.1$ | $x < -2.6$ *or* $x > 0.1$ | $(-\infty, -2.6) \cup (-0.1, \infty)$ | $(-2.6, 0.1)$

QUESTION 8

On solving by graphing, the solution set of the quadratic inequality

$3x^2 + 5x + 1 < 2$

is found to be $(-1.85, 0.18)$.

QUESTION 9

For the quadratic inequality

$ax^2 + bx + c \geq 0$

, where

$a < 0$

and the roots of the related quadratic function are

x_1

and

x_2

, the solution set is $\{x|x_1 \leq x \leq x_2\}$.

QUESTION 10

Fill in the missing information.

Inequality Symbol	Leading Coefficient	The direction in which the parabola opens	x -values from the graph included in the solution
$\geq$	$a > 0$	upwards ✓	graph above ✓ the x -axis

below | not included | downwards | $\{x|x < x_1 \text{ or } x > x_2\}$ | $\{x|x_1 < x < x_2\}$ | $\{x|x_1 \leq x \leq x_2\}$

QUESTION 11

For the quadratic inequality

$ax^2 + bx + c < 0$

where

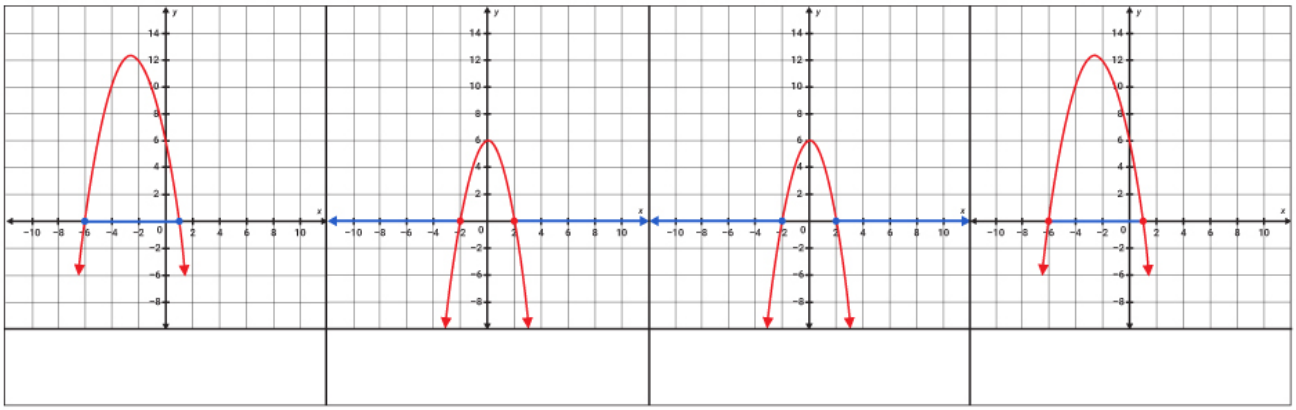
$a > 0$

, the parabola opens up ✓ and the roots are not included ✓.

included | to the left | down | to the right

QUESTION 12

Match the solution set to the related graphs.



$\{x|x < -6$ or $x > 1\}$ ✓ | $\{x|-2 < x < 2\}$ | $\{x|-2 \leq x \leq 2\}$ | $\{x|x < -2 \text{ or } x > 2\}$ ✓ | $\{x|x \leq -6$ or $x \geq 1\}$ | $\{x|x \leq -2 \text{ or } x \geq 2\}$

QUESTION 13

For the inequality

$ax^2 + bx + c \geq 0$

, where

$a < 0$

and the roots are

x_1

and

x_2

, which of the below statements are true?

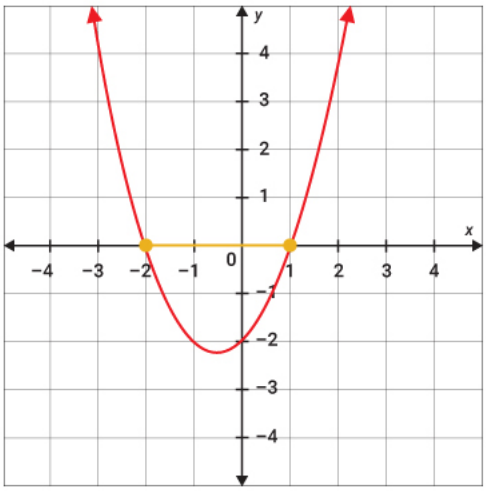
- ☐ The solution set is $\{x|x_1 < x < x_2\}$.
- ☐ The solution set is $\{x|x \leq x_1 \text{ or } x \geq x_2\}$.
- ☑ The parabola opens downwards. ✓
- ☑ The solution set is $\{x|x_1 \leq x \leq x_2\}$. ✓

The solution set is
$\{x|x < x_1 \text{ or } x > x_2\}$
.

The parabola opens upwards.

QUESTION 14

Identify the solution set for the given graph.



$\{x|x \leq -2 \text{ or } x \geq 1\}$

$\{x|-2 < x < 1\}$

$\{x|-2 \leq x \leq 1\}$

$\{x|x < -2 \text{ or } x > 1\}$

QUESTION 15

Solve the inequality

$-x^2+4x+12>0$

by graphing and find the solution set.

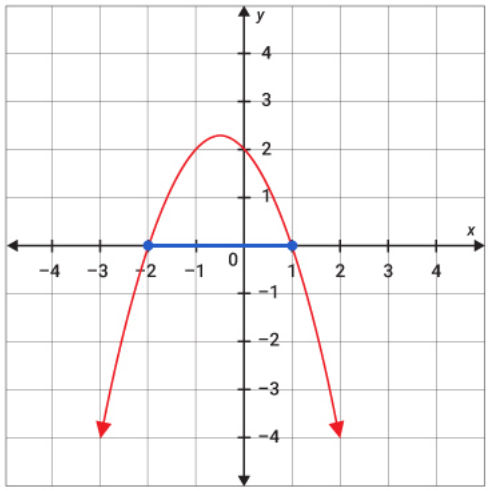
- $\{x|x<-2 \text{ or } x>6\}$
- $\{x|-2<x<6\}$ ✓
- $\{x|-2\leq x\leq 6\}$
- $\{x|x\leq -2 \text{ or } x\geq 6\}$

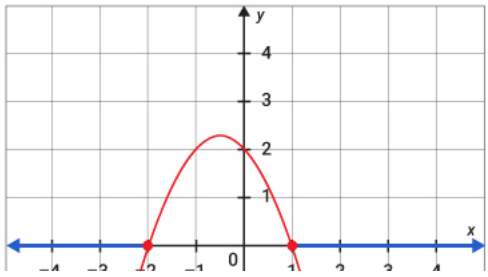
QUESTION 16

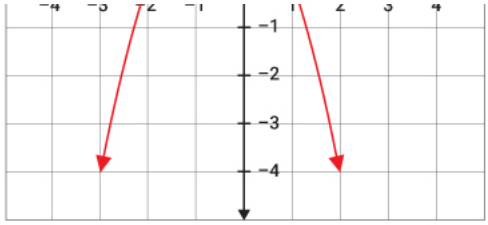
Which graph represents the solution for the inequality

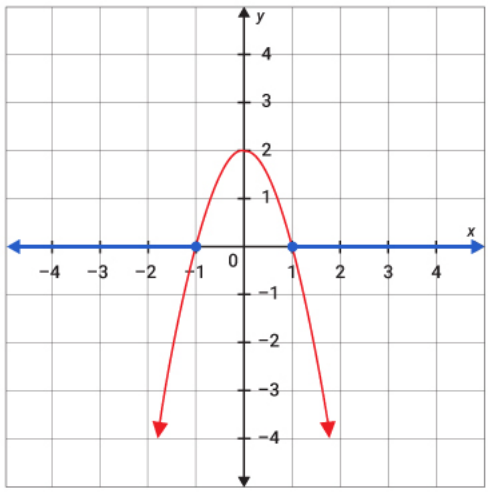
$-x^2-x+2\leq 0$

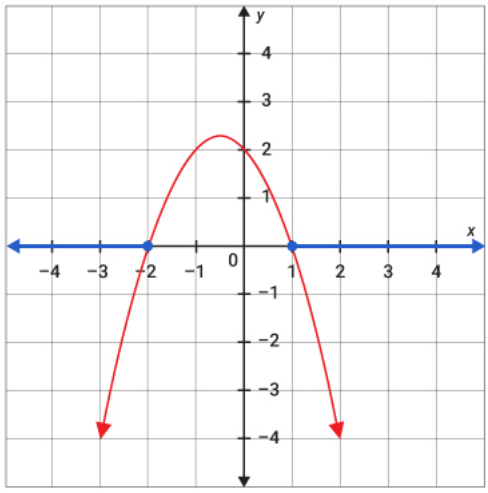
?









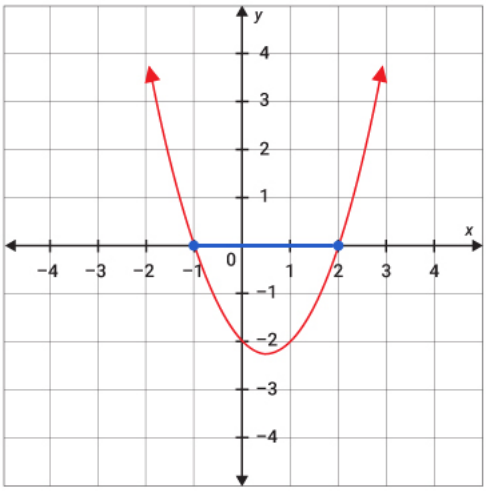


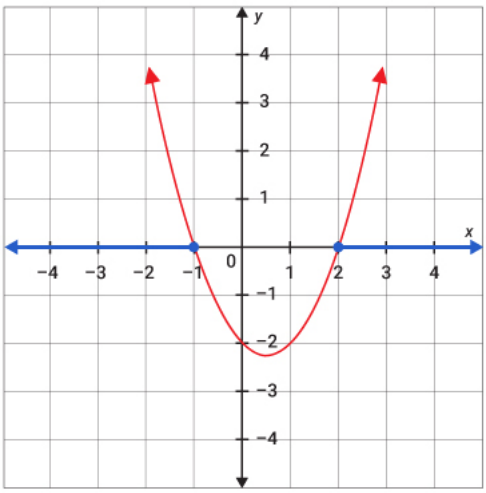
QUESTION 17

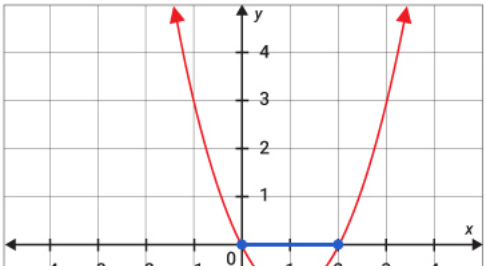
Which graph represents the solution of the inequality

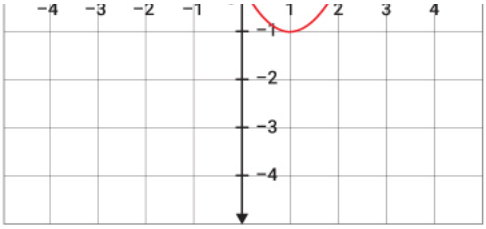
$x^2 - x - 2 \geq 0$

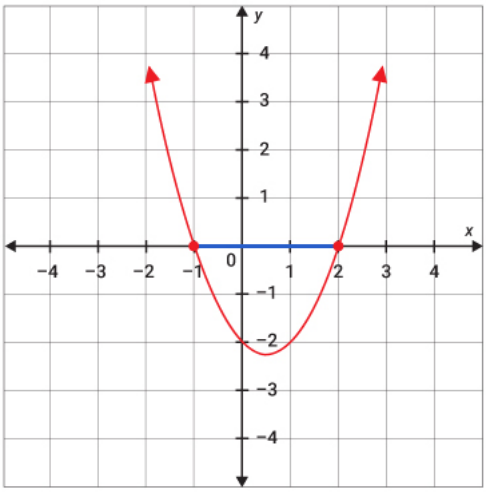
?











QUESTION 18

The height of a tennis ball hit into the air is modeled by the function

$h(t) = -16t^2 + 64t - 33$

, where height $h(t)$ is given in meters and time t in seconds. Find the interval of time when the height of the ball is at least 15 meters?



- $t \geq 3$
- $1 \leq t \leq 3$ ✓
- $1 < t < 3$

$t \leq 1$
or
$t \geq 3$

QUESTION 19

Solve the quadratic inequality
$x^2 + 9x + 8 > 0$
algebraically and select the correct solution set from the given options.

- $(-8, -1)$
- $[-8, 1]$
- $(-\infty, -8] \cup [-1, \infty)$
- $(-\infty, -8) \cup (-1, \infty)$ ✓

QUESTION 20

A rectangular garden has a length that is 7 meters more than its width. If the area is greater than
$98\ m^2$
, what can be the length of the garden?



- $x > 14$ ✓
- $0 < x < 14$
- $x < -7$ *or* $x > 14$

$x < -7$

QUESTION 21

Ibrahim designs lampshades with its shape modeled by the quadratic function

$$y = -\frac{1}{3}x^2 + 2x$$

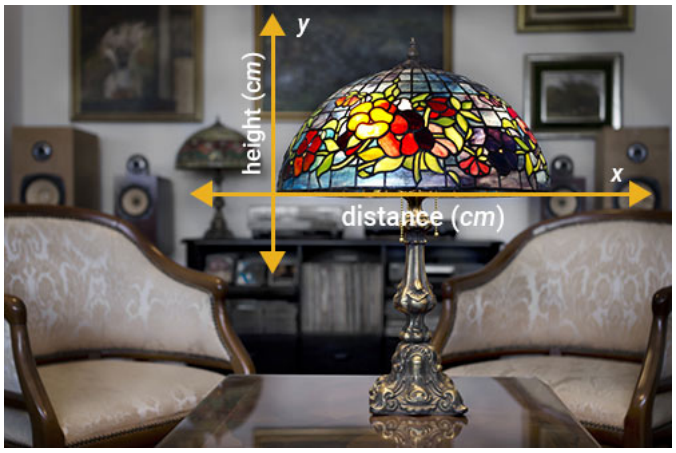
where

y

is the height in centimeters and

x

is the distance from one edge of the parabola to the other in centimeters.
What is the standard form of the quadratic inequality if the minimum height is more than 20 centimeters?



$-\frac{1}{3}x^2 + 2x + 20 > 0$

$-\frac{1}{3}x^2 + 2x - 20 > 0$ ✓

$-\frac{1}{3}x^2 + 2x + 20 \geq 0$

$-\frac{1}{3}x^2 + 2x - 20 \geq 0$

QUESTION 22

The arch of an underpass can be modeled by the quadratic function

$$y = -\frac{1}{4}x^2 + 5x - 10$$

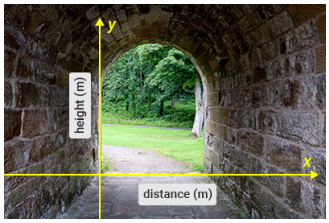
where

y

is the height from the ground (in meters) and

x

is the horizontal distance between the two ends of the arch (width in meters). If the height of the arch is not more than 15 meters, the standard form of the quadratic inequality formed is $-\frac{1}{4}x^2+5x-25\leq 0$ ✓.



$-\frac{1}{4}x^2+5x-5\leq 0$ $-\frac{1}{4}x^2+5x-25>0$ $-\frac{1}{4}x^2+5x-25<0$

QUESTION 23

The solution set of inequality

$\frac{n(n+1)}{2}<55$

is $(-11,\ 10)$ ✓ ⌄.

QUESTION 24

A slinky toy forms an arch that can be modeled by the quadratic equation

$y=-\frac{1}{8}x^2+2x$

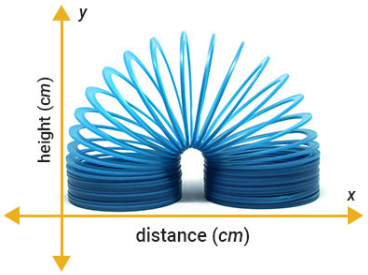
where

y

is the height above the ground in centimeters and

x

is the horizontal distance in centimeters from one end of the toy seen from the ground level to the other end. If the height of the toy is at least 15 centimeters from the ground, what is the standard form of the quadratic inequality formed?



- ○ $-\frac{1}{8}x^2+2x-15>0$
- ○ $-\frac{1}{8}x^2+2x-15\leq 0$

$-\frac{1}{8}x^2+2x-15<0$

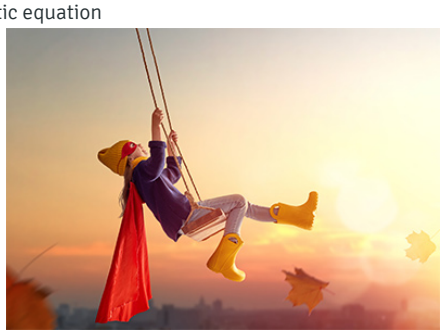
$-\frac{1}{8}X^2+2X-15\geq 0$ ✓

QUESTION 25

If the path of a swing is traced, the shape is that of a parabola. This parabola is modeled by the quadratic equation

$h(t)=\frac{1}{5}t^2-t+2$

where
$h(t)$
is the height in meters reached by the swing in
t
seconds. What is the standard form of the quadratic inequality formed, if the maximum height the swing reaches cannot be more than 3 meters above the ground?



$\frac{1}{5}t^2-t-1<0$

$\frac{1}{5}t^2-t-1\geq 0$

$\frac{1}{5}t^2-t-1>0$

$\frac{1}{5}t^2-t-1\leq 0$ ✓

QUESTION 26

The roots of the quadratic inequality

$x(x+12)<0$

are -12 and 0.

QUESTION 27

Solve the quadratic inequality

$2x^2+3x-8\geq 0$

algebraically and select the correct solution set from the below options.

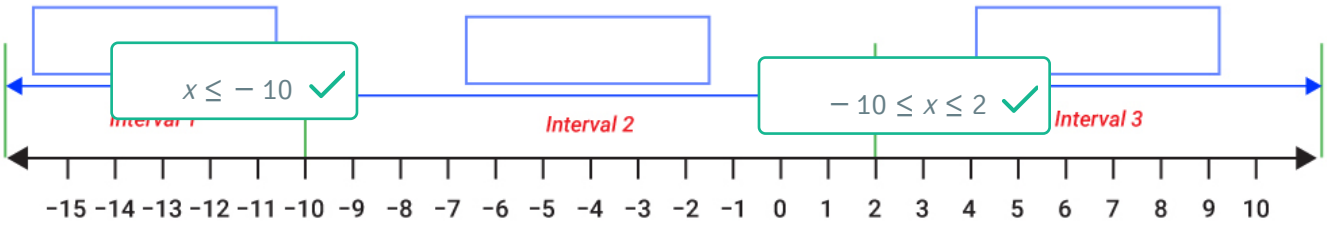
- [x] $\{x|x\leq -2.89 \text{ or } x\geq 1.39\}$
- [ ] $(-\infty,-2.89)\cup(1.39,\infty)$
- [ ] $(-\infty,-5.5]\cup[0.5,\infty)$
- [ ] $\{x|x\leq -5.5 \text{ or } x\geq 0.5\}$
- [ ] $\{x|x<-2.89 \text{ or } x>1.39\}$
- [ ] $(-5.5,-0.5)$
- [x] $(-\infty,-2.89]\cup[1.39,\infty)$
- [ ] $\{x|-2\leq x\leq 0.5\}$

QUESTION 28

For the inequality

$x^2+8x-20\leq 0$

, the roots have been plotted on the number line below. Fill in the blanks with the missing information.



$-10 < x < 2$ $x < -10$ $x > 2$

QUESTION 29

The roots of the quadratic inequality

$x^2 + 8x - 9 \leq 0$

are and .

QUESTION 30

The roots of the inequality

$x^2 + 3x - 10 \geq 0$

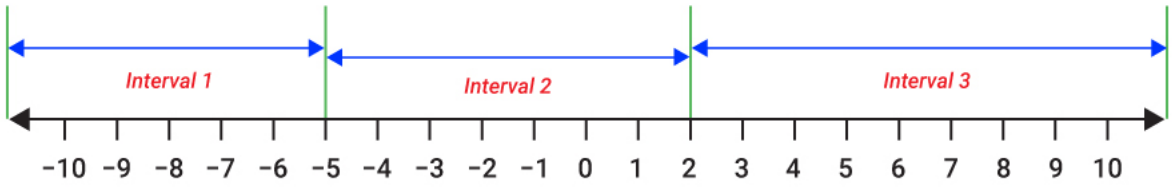
are

-5

and

2

. The roots are plotted on a number line.



The solution for this inequality is in interval 1 or interval 3 .

interval 1 only | interval 2 only | interval 2 or interval 3 | interval 3 only