

QUESTION 1



A warehouse has a volume of $v(x) = x^3 + 600x^2 + 1100x + 500$

cubic meters, where x is the height of the warehouse. What is the volume of the warehouse with a height of 5 meters?



$$\begin{array}{r} 5 \overline{) 1 \ 600 \ 1100 \ 500} \\ \underline{ 25 \ 3125 \ 21,125} \\ 5 \ 625 \ 4225 \ 21,625 \end{array}$$

The volume is 21,125 cubic meters.



$$\begin{array}{r} 5 \overline{) 1 \ 600 \ 1100 \ 500} \\ \underline{ 25 \ 3125 \ 21,125} \\ 5 \ 625 \ 4225 \ 21,625 \end{array}$$

The volume is 21,625 cubic meters.



$$\begin{array}{r} 5 \overline{) 1 \ 600 \ 1100 \ 500} \\ \underline{ 5 \ 3025 \ 20,625} \\ 1 \ 605 \ 4125 \ 21,125 \end{array}$$

The volume is 21,125 cubic meters.





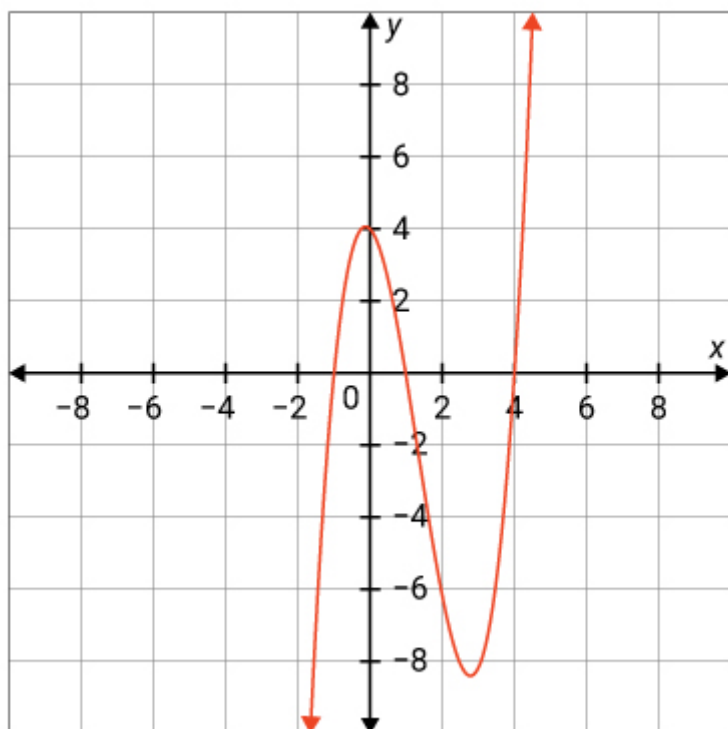
$$\begin{array}{r} 5 \overline{) 1 \ 600 \ 1100 \ 500} \\ \underline{ 5 \ 3025 \ 20,625} \\ 1 \ 605 \ 4125 \ 21,125 \end{array}$$

The volume is 20,625 cubic meters.

QUESTION 2



What are the factors of the polynomial shown in the graph?



$$(x - 4)(x + 1)(x + 1)$$



$$(x - 4)(x - 1)(x - 1)$$

☐ $(x - 1)(x + 1)(x + 4)$

☒ $(x - 4)(x - 1)(x + 1)$ ✓

QUESTION 3



Verify that

$$x - 5$$

is a factor of the polynomial

$$f(x) = x^3 - 15x^2 + 66x - 80$$

by completing this synthetic substitution. Then, find the remaining factors.

$$\begin{array}{r|rrrr} 5 & 1 & -15 & 66 & -80 \\ & & 5 & & 80 \\ \hline & 1 & -10 & 16 & \end{array}$$

The remaining factors are

$$x - 8$$

☒ and

$$x - 2$$

.



The remaining factors are

$$x - 8$$

☐ and

$$x + 2$$

.

The remaining factors are

$x + 2$



and

$x + 8$

.

The remaining factors are

$x - 2$



and

$x + 8$

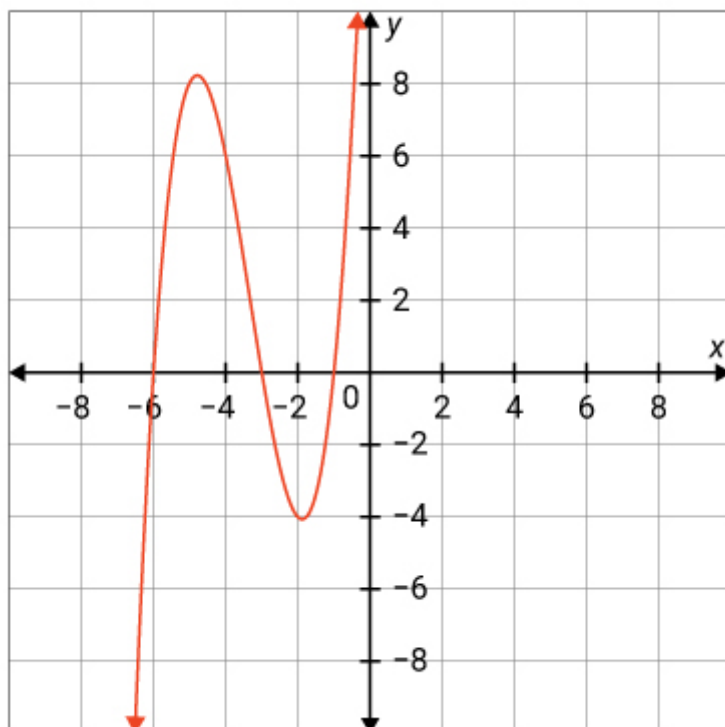
.

QUESTION 4



Identify the roots of the polynomial and write its factors.

Drag and drop your answer to correctly complete the sentence.



The factors are $(x + 1)(x + 3)(x + 6)$ ✓.

$$(x - 6)(x - 3)(x + 1)$$

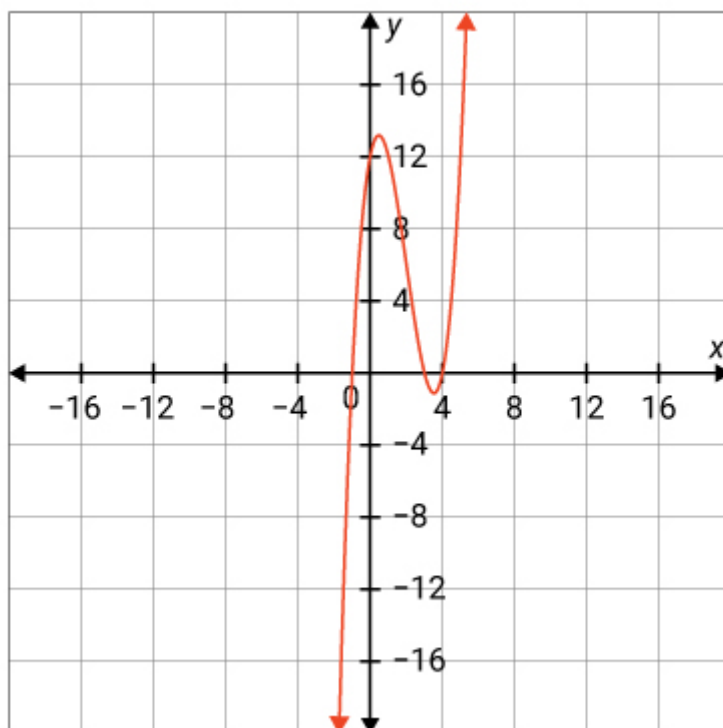
$$(x - 1)(x + 3)(x + 6)$$

$$(x - 6)(x - 3)(x - 1)$$

QUESTION 5



Identify the factors of the polynomial shown in the graph.



Drag and drop your answer to correctly complete the sentence.
The factors are

$$(x - 4)(x - 3)(x + 1)$$
 ✓.

$$(x - 1)(x - 3)(x - 4)$$

$$(x + 1)(x + 3)(x + 4)$$

$$(x - 4)(x - 3)(x - 1)$$

$$(x + 1)(x + 3)(x + 4)$$

$$(x - 1)(x + 3)(x + 4)$$

QUESTION 6



Verify that

$$x + 3$$

is a factor of the polynomial

$$f(x) = x^3 - 2x^2 - 29x - 42$$

by completing this synthetic substitution. Then, find the remaining factors.

$$\begin{array}{r|rrrr} -3 & 1 & -2 & -29 & -42 \\ & & -3 & & 42 \\ \hline & 1 & -5 & -14 & 0 \end{array}$$

Select your answer from the drop-down menu.

The remaining factors are

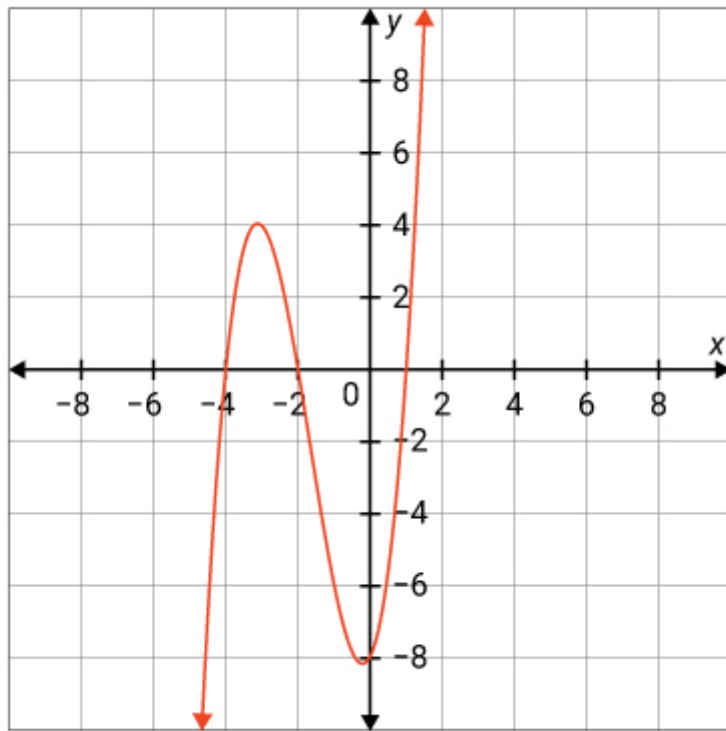
and



QUESTION 7



Identify the roots of the polynomial and write its factors.



☐ $(x - 2)(x - 1)(x + 4)$

☐ $(x - 4)(x + 1)(x + 2)$

☐ $(x - 4)(x - 2)(x + 1)$

☒ $(x - 1)(x + 2)(x + 4)$



QUESTION 8



Verify that

$$x - 2$$

is a factor of the polynomial

$$f(x) = x^3 - 4x^2 - 20x + 48$$

by completing this synthetic substitution. Then, find the remaining factors.

$$\begin{array}{r|rrrr} 2 & 1 & -4 & -20 & 48 \\ & & 2 & & -48 \\ \hline & 1 & -2 & -24 & 0 \end{array}$$

Select your answer from the drop-down menu.

The remaining factors are

and



QUESTION 9



Verify that

$$x + 1$$

is a factor of the polynomial

$$f(x) = x^3 + 3x^2 - 6x - 8$$

by completing this synthetic substitution. Then, find the remaining factors.

$$\begin{array}{r|rrrr} -1 & 1 & 3 & -6 & -8 \\ & & -1 & & 8 \\ \hline & 1 & 2 & -8 & 0 \end{array}$$

Select your answer from the drop-down menu.

The remaining factors are

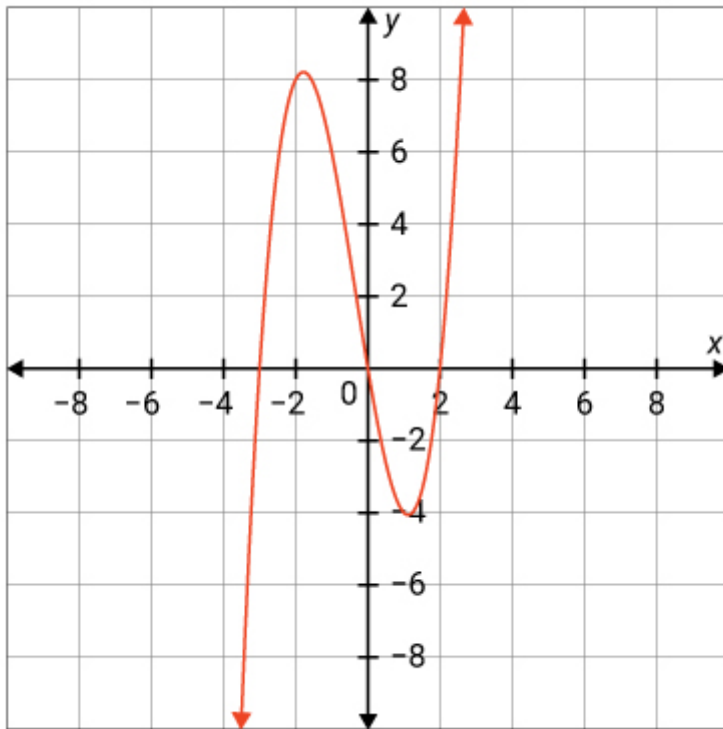
and



QUESTION 10



Identify the roots of the polynomial and write its factors.



☒ $x(x - 2)(x + 3)$



☐ $x(x + 2)(x + 3)$

☐ $x(x + 2)(x - 3)$

☐ $x(x - 2)(x - 3)$

QUESTION 11



Verify that

$$x - 3$$

is a factor of the polynomial by completing the synthetic substitution. Then, find the remaining factors.

$$\begin{array}{r|rrrr} 3 & 1 & 11 & 6 & -144 \\ & & 3 & & 144 \\ \hline & 1 & 14 & 48 & \end{array}$$

☐ The remaining factors are
 $x - 8$
and
 $x - 6$
.

☒ The remaining factors are
 $x + 6$
and
 $x + 8$
.

☐ The remaining factors are
 $x - 8$
and
 $x + 6$
.

☐ The remaining factors are
 $x - 6$
and
 $x + 8$
.

QUESTION 12



Given that

$$x + 6$$

and

$$x + 4$$

are factors of the polynomial

$$f(x) = x^4 + 4x^3 - 31x^2 - 94x + 120$$

, find the remaining factors.

Complete the synthetic substitution that verifies

$$x + 6$$

is a factor.

$$\begin{array}{r|rrrrrr} -6 & 1 & 4 & -31 & -94 & 120 \\ & & & 12 & & -120 \\ \hline & 1 & -2 & -19 & 20 & \end{array}$$

Select your answer from the drop-down menu.

The remainder The remainder so

$$x + 6$$

is a factor of

$$f(x)$$

is

0 ✓ ▼

The remaining factors are

and

✓ ▼

QUESTION 13



Given that

$$x + 7$$

and

$$x - 4$$

are factors of the polynomial

$$f(x) = x^4 + 6x^3 - 37x^2 - 138x + 504$$

, find the remaining factors.

Complete the synthetic substitution to verify

$$x + 7$$

is a factor.

$$\begin{array}{r|rrrrrr} -7 & 1 & 6 & -37 & -138 & 504 \\ & & & 7 & & -504 \\ \hline & 1 & -1 & -30 & 72 & \end{array}$$

Select your answer from the drop-down menu.

The remainder so

$$x + 7$$

is a factor of

$$f(x)$$

is ✓ ▼ .

The remaining factors are ✓ ▼ .

QUESTION 14



Confirm that

$$x - 5$$

and

$$x - 1$$

are factors of the polynomial

$$f(x) = x^4 - 3x^3 - 23x^2 + 75x - 50$$

and find the remaining factors. Enter your answers in the spaces provided.

5 1 - 3 - 23 7

a 10 *t*

1 2 - 13 1



a =

5 ✓

b =

-65 ✓

c =

0 ✓

The other factors are

$x +$

5 ✓

and

$x -$

2 ✓

QUESTION 15



Confirm that

$$x - 3$$

and

$$x - 2$$

are factors of the polynomial

$$f(x) = x^4 - 8x^3 - 33x^2 + 252x - 324$$

and find the remaining factors. Enter your answers in the spaces provided.

<u>2</u>	1	- 8	- 33	252
		<i>a</i>	- 12	<i>b</i>
_____	_____	_____	_____	_____
	1	- 6	- 45	162

◀

▶

a =

2
✓

b =

-90
✓

c =

0
✓

The other factors are

$x +$

6
✓
and

$x -$

9
✓

QUESTION 16



Confirm that

$$x - 1$$

and

$$x + 2$$

are factors of the polynomial

$$f(x) = x^4 - 15x^2 - 10x + 24$$

and find the remaining factors.

Enter your answers in the spaces provided.

<u>1</u>	1	0	- 15
		<i>a</i>	1
—	—	—	—
	1	1	- 14

◀

▶

a =

1

✓

b =

-14

✓

c =

0



The other factors are

$x +$

3



and

$x -$

4



QUESTION 17



Use the Factor Theorem to determine if

$x + 2$

is a factor of

$$x^4 - 11x^3 + 21x^2 + 59x - 70$$

.

Drag and drop your answers to correctly complete the sentence.

$x + 2$

is



a factor of

$$x^4 - 11x^3 + 21x^2 + 59x - 70$$

because the remainder

equals



0.

does not equal

is not

QUESTION 18



Use the Factor Theorem to determine if

$$x - 4$$

is a factor of

$$x^4 + 5x^3 - 5x^2 - 45x - 36$$

.

Drag and drop your answers to correctly complete the sentence.

$$x - 4$$

is not



a factor of

$$x^4 + 5x^3 - 5x^2 - 45x - 36$$

because the remainder

does not equal



0.

is

equals

QUESTION 19



Use the Factor Theorem to determine if

$$x + 6$$

is a factor of

$$x^3 - x^2 - 32x + 60$$

.

$$x + 6$$

is not a factor of



$$x^3 - x^2 - 32x + 60$$

because the remainder is 0.



$$x + 6$$

is a factor of

$$x^3 - x^2 - 32x + 60$$

because the remainder is 0.



$$x + 6$$

is not a factor of

$$x^3 - x^2 - 32x + 60$$

because the remainder is

$$-6$$

.



$$x + 6$$

is a factor of

$$x^3 - x^2 - 32x + 60$$

because the remainder is

$$-6$$

.

QUESTION 20



Determine if

$$x + 1$$

is a factor of

$$x^3 + 8x^2 + 11x - 20$$

using the Factor Theorem.



$$x + 1$$

is a factor of

$$x^3 + 8x^2 + 11x - 20$$

because the remainder is 0.



$$x + 1$$

is a factor of

$$x^3 + 8x^2 + 11x - 20$$

because the remainder is

$$-1$$

.



$$x + 1$$

is not a factor of

$$x^3 + 8x^2 + 11x - 20$$

because the remainder is not 0.



$$x + 1$$

is not a factor of

$$x^3 + 8x^2 + 11x - 20$$

because the remainder is not

$$-1$$

.



Use the Factor Theorem to determine if

$$x - 4$$

is a factor of

$$x^3 - 2x^2 - 23x + 60$$

.



$$x - 4$$

is a factor of

$$x^3 - 2x^2 - 23x + 60$$

because the remainder is 0.



$$x - 4$$

is not a factor of

$$x^3 - 2x^2 - 23x + 60$$

because the remainder is 4.



$$x - 4$$

is not a factor of

$$x^3 - 2x^2 - 23x + 60$$

because the remainder is 0.



$$x - 4$$

is a factor of

$$x^3 - 2x^2 - 23x + 60$$

because the remainder is 4.



The height of riders, in meters, on an amusement park ride can be modeled by

$$f(x) = -x^5 + 12x^4 - 56x^3 +$$

, where

x

is the number of seconds since the beginning of the ride. What is the height of the riders after 1 second? Use synthetic substitution to find the height.



Drag and drop your answer to correctly complete the sentence.

The height after 1 second is meters.

77

60

83

QUESTION 23



The average number of people visiting a library can be modeled by

$$f(x) = x^5 - 10x^4 + 36x^3 - 56x^2 + 32x - 16$$

, where x is the number of hours since the library opens. What is the average number of people that visit the library three hours after it opens? Use synthetic substitution to find the average number of people.



Drag and drop your answer to correctly complete the sentence.

The average number of people that visit the library three hours after it opens is

12



15

18

33

QUESTION 24



The average daily attendance for a park each year from 2010 to 2015 can be modeled by

$$f(x) = -0.5x^4 + 5x^3 - 18x^2$$

, where x is the number of years since 2010. What was the average daily attendance in 2014? Use synthetic substitution to calculate the attendance.



Select your answer from the drop-down menu.

The average daily attendance in 2014 was

154



QUESTION 25



The number of people waiting to purchase tickets to a show can be modeled by

$$f(x) = -x^4 + 5x^3 - 6x^2 - 2x + 44$$

, where x is the number of hours after the tickets went on sale.

How many people are waiting 3 hours after tickets went on sale? Use synthetic substitution to find the value.

There are people waiting after 3 hours.

QUESTION 26

The total number of people who bought a certain type of digital camera from 2000 to 2011 can be modeled by the function

$$f(x) = x^4 + 3x^3 + 22x^2 - 12x$$

, where x is the number of years since 2000. Estimate the number of people who had bought the camera by 2011. Use synthetic substitution to estimate.

Select your answer from the drop-down menu.

The number of people who had bought the camera by 2011 is .



QUESTION 27

The value of a television can be calculated using

$$f(x) = -x^3 - 4x^2 - 6x + 396$$

, where x is the number of years since the television was purchased. What is the value of the television after 4 years? Use synthetic substitution to find the value. Enter your answer in the space provided.



<u>4</u>	- 1	- 4	- 6
		- 4	- 32
_____	_____	_____	
- 1	- 8	-38	

The value of the television after 4 years is AED

244 ✓

QUESTION 28

The population of a town can be modeled by $f(x) = 0.02 x^3 - 2 x^2 + 4 x + 8000$, where x is the number of years since 2000. Use synthetic substitution to estimate the population of the town in 2060.

Enter your answers in the spaces provided.



60 0.02 - 2 4

1.2 - 48

0.02 - 0.8 -44

◀ ▶

The estimated population of the town in 2060 is

5360



QUESTION 29



The volume of a shoe box is

$$v(x) = x^3 + 20x^2 + 300x + 23$$

cubic centimeters, where x is the height of the shoe box. Calculate the volume of the shoe box if the height is 13 centimeters.



☐

$$\begin{array}{r} \underline{13} 1 20 300 23 \\ 13 91 2717 \\ \hline 1 7 209 | 2694 \end{array}$$

The volume is 2,694 cubic centimeters.

☐

$$\begin{array}{r} \underline{13} 1 20 300 23 \\ 13 429 9477 \\ \hline 1 33 729 | 9500 \end{array}$$

The volume is 9,477 cubic centimeters.

☐

$$\begin{array}{r} \underline{13} 1 20 300 23 \\ 13 91 2717 \\ \hline 1 7 209 | 2694 \end{array}$$

The volume is 2,717 cubic centimeters.

$$\begin{array}{r} \underline{13} 1 20 300 23 \\ 13 429 9477 \end{array}$$



1 33 729 | 9500



The volume is 9,500 cubic centimeters.

QUESTION 30



A rectangular swimming pool has a volume of

$$v(x) = x^3 + 10x^2 + 31x + 30$$

cubic meters, where x is the depth in meters. What is the volume of the pool with a depth of 1 meter?



$$\begin{array}{r} \underline{1} \\ 1 \\ \hline 1 \end{array}$$

The volume is 22 cubic meters.



$$\begin{array}{r} \underline{1} \\ 1 \\ \hline 1 \end{array}$$

The volume is 8 cubic meters.

$$\begin{array}{r} \underline{1} \\ 1 \\ \hline 1 \end{array}$$

1 11 42 | 72



$$\begin{array}{r|rrrr} 1 & 1 & 10 & 31 & 30 \\ & & 1 & 11 & 42 \\ \hline & 1 & 11 & 42 & | 72 \end{array}$$

The volume is 42 cubic meters.