

3.1 Puzzle Time

Where Does A Squirrel Keep Its Winter Clothes?

Write the letter of each answer in the box containing the exercise number.

Compare the graph of the function to the graph of $f(x) = x^2$.

1. $b(x) = -x^2$

2. $p(x) = 5x^2$

3. $q(x) = \frac{1}{3}x^2$

4. $t(x) = -4x^2$

5. $c(x) = -0.7x^2$

6. $h(x) = 6.4x^2$

7. $r(x) = 0.12x^2$

8. $d(x) = -\frac{8}{5}x^2$

9. $s(x) = \left(\frac{2}{3}x\right)^2$

10. $k(x) = \frac{1}{9}x^2$

11. The cross section of a parabolic bowl can be modeled by $g(x) = \frac{2}{5}x^2$. Compare the graph to the graph of $f(x) = x^2$.

12. The decorated archway at the entrance to a craft fair can be modeled by $h(x) = -7x^2$. Compare the graph to the graph of $f(x) = x^2$.

Answers

E. vertical shrink by a factor of $\frac{1}{3}$

T. vertical shrink by a factor of $\frac{1}{9}$

K. reflection in the x -axis; vertical shrink by a factor of 0.7

N. reflection in the x -axis

A. vertical shrink by a factor of $\frac{2}{5}$

T. vertical shrink by a factor of 0.12

R. reflection in the x -axis; vertical stretch by a factor of 4

N. vertical stretch by a factor of 5

R. reflection in the x -axis; vertical stretch by a factor of $\frac{8}{5}$

I. vertical stretch by a factor of 6.4

E. horizontal stretch by a factor of $\frac{3}{2}$

U. reflection in the x -axis; vertical stretch by a factor of 7

6	2		11		7	4	9	3		10	8	12	1	5
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3.2 Puzzle Time

Where Do Birds Relax In Their Houses?

Write the letter of each answer in the box containing the exercise number.

Compare the graph of the function to the graph of $f(x) = x^2$.

- | | |
|--------------------------------|-----------------------------------|
| 1. $j(x) = x^2 - 5$ | 2. $m(x) = x^2 + 4$ |
| 3. $c(x) = -x^2 - 8$ | 4. $r(x) = 6x^2 - 7$ |
| 5. $g(x) = \frac{1}{3}x^2 + 9$ | 6. $p(x) = -\frac{5}{12}x^2 - 14$ |

Write an equation that represents g in terms of x .

- | | |
|---|--|
| 7. $f(x) = 6x^2 + 5$
$g(x) = f(x) + 3$ | 8. $f(x) = \frac{3}{4}x^2 + 7$
$g(x) = f(x) - 10$ |
| 9. $f(x) = -\frac{8}{9}x^2 - 13$
$g(x) = f(x) - 2$ | 10. $f(x) = 14x^2 - 25$
$g(x) = f(x) + 18$ |

Find the zeros of the function.

- | | |
|------------------------|------------------------|
| 11. $y = x^2 - 4$ | 12. $y = x^2 - 81$ |
| 13. $f(x) = -x^2 + 36$ | 14. $f(x) = 3x^2 - 75$ |
15. The function $y = -2x^2 + 98$ represents the height y (in inches) of a penny x seconds after falling to the ground. Find the x -intercept.

Answers

- E. $x = -9, x = 9$
- N. $x = -5, x = 5$
- H. $x = 7$
- T. $x = -2, x = 2$
- O. $x = -6, x = 6$
- B. $x = 10$
- T. $g(x) = 14x^2 - 7$
- E. $g(x) = \frac{3}{4}x^2 - 3$
- C. $g(x) = 6x^2 + 8$
- O. $g(x) = -\frac{8}{9}x^2 - 15$
- R. reflection in the x -axis, translation 8 units down
- F. vertical shrink by a factor of $\frac{1}{3}$, translation 9 units up
- H. translation 4 units up
- P. reflection in the x -axis, vertical shrink by a factor of $\frac{5}{12}$, translation 14 units down
- N. vertical stretch by a factor of 6, translation 7 units down
- R. translation 5 units down

9	14		11	2	8		5	1	13	4	10		6	12	3	7	15
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Puzzle Time

What Has More Letters Than The Alphabet?

Write the letter of each answer in the box containing the exercise number.

Find the axis of symmetry and the vertex of the graph of the function.

1. $y = 2x^2 + 8x + 7$ 2. $y = 6x^2 - 4x - 9$
 3. $y = -\frac{3}{5}x^2 - 12x - 25$ 4. $y = -\frac{9}{4}x^2 - 18x + 60$

Describe the domain and range of the function.

5. $y = 4x^2 + 16x - 7$
 6. $y = -6x^2 + 48x - 40$
 7. $y = -3x^2 + 12x + 9$
 8. $y = 5x^2 - 40x + 60$

Tell whether the function has a minimum value or a maximum value. Then find the value.

9. $y = 3x^2 - 12x + 1$
 10. $y = -4x^2 + 48x - 144$
 11. $y = -\frac{1}{2}x^2 - 8x - 7$
 12. $y = 2x^2 + 2x + 7$
 13. The function $h(t) = -4t^2 + 20t$ represents the height (in feet) of an athlete t seconds after pole vaulting. After how many seconds does the athlete reach his or her maximum height?

Answers

H. $x = \frac{1}{3}; \left(\frac{1}{3}, -\frac{29}{3}\right)$
 S. $x = -4; (-4, 96)$
 I. $x = -10; (-10, 35)$
 E. $x = -2; (-2, -1)$
 T. 2.5
 B. 5
 F. maximum; 0
 O. maximum; 25
 E. minimum; -11
 T. minimum; $\frac{13}{2}$
 C. all real numbers; $y \leq 56$
 P. all real numbers; $y \geq -20$
 F. all real numbers; $y \geq -23$
 O. all real numbers; $y \leq 21$

13	2	9		8	11	4	12		7	5	10	3	6	1
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3.4 Puzzle Time

How Do You Make Sure You Pass A Geometry Test?

Write the letter of each answer in the box containing the exercise number.

Determine whether the function is *even*, *odd*, or *neither*.

1. $f(x) = 5x^2 + 2$ 2. $c(x) = -\frac{3}{4}x$
 3. $g(x) = 6x - 9$

Find the vertex and the axis of symmetry of the graph of the function.

4. $d(x) = 4(x + 2)^2$ 5. $r(x) = -7(x + 5)^2 - 6$
 6. $h(x) = 2(x - 8)^2 + 12$ 7. $s(x) = -9(x - 3)^2 + 7$

Compare the graph of the function to the graph of $f(x) = x^2$.

8. $b(x) = 3(x + 4)^2$ 9. $w(x) = -(x - 1)^2 - 9$
 10. $k(x) = \frac{1}{8}(x - 6)^2$ 11. $m(x) = (x + 7)^2 + 10$

Write a quadratic function in vertex form whose graph has the given vertex and passes through the given point.

12. vertex: $(-4, -2)$; passes through $(-7, 7)$
 13. vertex: $(2, 3)$; passes through $(4, 11)$
 14. vertex: $(-4, 6)$; passes through $(0, -26)$
 15. vertex: $(8, 1)$; passes through $(10, 13)$
 16. A portion of a ski slope is in the shape of a parabola. Write a quadratic function that models this portion of the ski slope with a maximum height of 125 feet, represented by a vertex of $(45, 125)$, passing through the point $(70, 0)$.

Answers

A. odd G. even
 W. neither
 E. $(8, 12)$; $x = 8$
 S. $(-2, 0)$; $x = -2$
 A. $(3, 7)$; $x = 3$
 L. $(-5, -6)$; $x = -5$
 K. $f(x) = 2(x - 2)^2 + 3$
 L. $f(x) = -\frac{1}{5}(x - 45)^2 + 125$
 H. $f(x) = (x + 4)^2 - 2$
 O. $f(x) = 3(x - 8)^2 + 1$
 N. $f(x) = -2(x + 4)^2 + 6$
 T. reflection in the x -axis, translation 1 unit right and 9 units down
 N. translation 7 units left and 10 units up
 L. translation 4 units left, and a vertical stretch by a factor of 3
 E. translation 6 units right, and a vertical shrink by a factor of $\frac{1}{8}$

13	11	15	3		2	16	5		9	12	6		7	14	1	8	10	4
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Puzzle Time

What Did One Wall Say To The Other Wall?

Write the letter of each answer in the box containing the exercise number.

Find the vertex and the axis of symmetry of the graph of the function.

1. $y = x^2 - 16$ 2. $f(x) = x^2 - 10x$
 3. $r(x) = x^2 + 7x + 12$ 4. $y = 3x^2 - 18x + 24$

Find the zero(s) of the function.

5. $s(x) = -3(x - 3)(x - 9)$ 6. $h(x) = \frac{1}{6}(x + 4)(x - 12)$
 7. $y = x^2 - 17x + 30$ 8. $g(x) = -4x^2 + 12x + 72$
 9. $y = x^2 - 14x$ 10. $c(x) = x^2 - 49$
 11. $v(x) = x^2 - 2x + 1$ 12. $k(x) = x^2 + 10x + 25$

Write a quadratic function in standard form whose graph satisfies the given condition(s).

13. vertex: $(-9, -4)$ 14. vertex: $(-\frac{3}{2}, -\frac{25}{4})$
 15. passes through $(-3, 0)$, $(4, 0)$, and $(2, 20)$
 16. passes through $(-3, 0)$, $(7, 0)$, and $(6, -36)$
 17. x -intercepts: -2 and 6
 18. x -intercepts: 1 and 5

Answers

T. $(5, -25); x = 5$
 O. $(-\frac{7}{2}, -\frac{1}{4}); x = -\frac{7}{2}$
 M. $(3, -3); x = 3$
 E. $(0, -16); x = 0$
 R. -4 and 12
 Y. 2 and 15
 O. -3 and 6
 H. 3 and 9
 U. 1
 E. 0 and 14
 C. -5
 T. -7 and 7
 A. $f(x) = -2x^2 + 2x + 24$
 N. $f(x) = x^2 - 6x + 5$
 E. $f(x) = x^2 + 3x - 4$
 R. $f(x) = x^2 - 4x - 12$
 E. $f(x) = x^2 + 18x + 77$
 T. $f(x) = 4x^2 - 16x - 84$

4	13	9	16		7	3	11		15	2		10	5	14		12	8	6	18	1	17
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Puzzle Time

What Do You Say When You Get Off A Boat?

Write the letter of each answer in the box containing the exercise number.

Simplify the expression.

1. $\sqrt{28}$
2. $-\sqrt{75}$
3. $\sqrt{63x^3}$
4. $-\sqrt{\frac{36x^2}{121}}$
5. $\sqrt{\frac{x^5}{64}}$
6. $\sqrt[3]{-54}$
7. $-\sqrt[3]{\frac{125x^2}{343y^3}}$
8. $\sqrt[3]{\frac{729}{-1000x^3y^6}}$
9. $\frac{6}{\sqrt{11}}$
10. $\sqrt{\frac{8}{28}}$
11. $\frac{\sqrt{12}}{\sqrt{5x^3}}$
12. $\frac{2}{\sqrt{13} + 1}$
13. $\frac{\sqrt{7}}{9 + \sqrt{7}}$
14. $\sqrt{2} - 3\sqrt{17} + 7\sqrt{2}$
15. $8\sqrt{24} - 6\sqrt{54}$
16. $(\sqrt{10} + \sqrt{40})(\sqrt{50} - \sqrt{18})$
17. The length of the board for a shelf is $(\sqrt{27} + \sqrt{3})$ feet.
The width of the board is $2\sqrt{2}$ feet. Find the area of the board in square feet.

Answers

<p>U. $-\frac{5\sqrt[3]{x^2}}{7y}$</p> <p>N. $\frac{x^2\sqrt{x}}{8}$</p> <p>T. $8\sqrt{6}$</p> <p>C. $\frac{-1 + \sqrt{13}}{6}$</p> <p>O. $-5\sqrt{3}$</p> <p>H. $12\sqrt{5}$</p> <p>F. $8\sqrt{2} - 3\sqrt{17}$</p> <p>R. $-3\sqrt[3]{2}$</p> <p>K. $\frac{\sqrt{14}}{7}$</p> <p>Y. $\frac{2\sqrt{15x}}{5x^2}$</p> <p>U. $-\frac{6x}{11}$</p>	<p>R. $3x\sqrt{7x}$</p> <p>M. $-\frac{9}{10xy^2}$</p> <p>Y. $\frac{6\sqrt{11}}{11}$</p> <p>H. $-2\sqrt{6}$</p> <p>E. $2\sqrt{7}$</p> <p>A. $\frac{-7 + 9\sqrt{7}}{74}$</p>
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17	15	13	5	10		11	2	7		14	1	6	3	9		8	4	12	16
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4.2 Puzzle Time

Why Do They Call The New Dance The Elevator?

Write the letter of each answer in the box containing the exercise number.

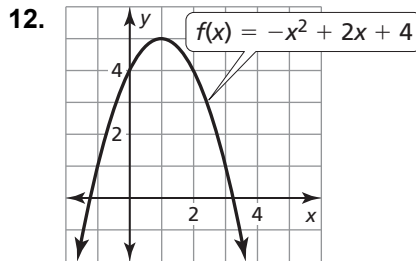
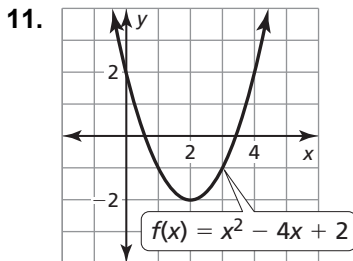
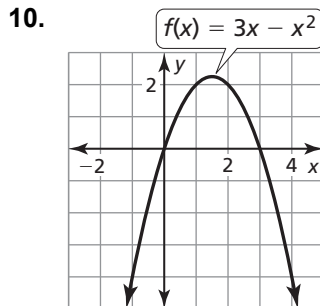
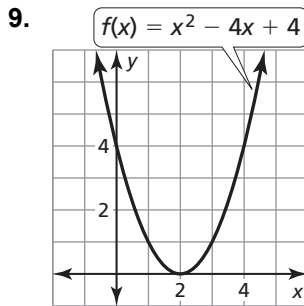
Write the equation in standard form.

- 1. $5x^2 = 14$
- 2. $-3x^2 = 16$
- 3. $7x - 8x^2 = 6$
- 4. $9 + 10x = 12x^2$

Solve the equation by graphing.

- 5. $x^2 - 6x = 0$
- 6. $x^2 - 3x + 7 = 0$
- 7. $x^2 = -8x - 16$
- 8. $-x^2 = -10x + 24$

Find the zero(s) of f . Approximate the zero(s) of f to the nearest tenth, if necessary.



Answers

- S. $3x^2 + 16 = 0$
- T. $12x^2 - 10x - 9 = 0$
- N. $8x^2 - 7x + 6 = 0$
- A. $5x^2 - 14 = 0$
- E. 4, 6
- S. no real solutions
- H. 0.6, 3.4
- T. 0, 6
- P. 0, 3
- I. -4
- O. 2
- S. -1.2, 3.2

7	4		11	1	6		3	9		12	5	8	10	2
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Puzzle Time

What Did The Chef Say To The Hungry Watch?

Write the letter of each answer in the box containing the exercise number.

Solve the equation using square roots. Round your solutions to the nearest hundredth, if necessary.

1. $x^2 = 49$
2. $x^2 = -121$
3. $x^2 - 64 = 0$
4. $5x^2 - 20 = 0$
5. $x^2 + 8 = 15$
6. $-4x^2 - 9 = -9$
7. $16x^2 + 3 = 4$
8. $7x^2 - 10 = 11$
9. $(x + 4)^2 = 0$
10. $(x - 2)^2 = 25$
11. $(5x + 1)^2 = 196$
12. $9(x + 3)^2 = 36$
13. $6x^2 - 15 = 21$
14. $25(x - 8)^2 = 81$
15. You drop a feather from a height of 160 centimeters. The function $h = -16x^2 + 160$ represents the height h (in centimeters) of the feather after x seconds. How long (in seconds) does it take the feather to touch the ground?

Answers

C. -4

W. no real solutions

S. $-3, \frac{13}{5}$

E. $-2.65, 2.65$

A. $-\frac{1}{4}, \frac{1}{4}$

B. $-2.45, 2.45$

N. $-8, 8$

O. $\frac{31}{5}, \frac{49}{5}$

S. $-2, 2$

O. 3.16

U. $-1.73, 1.73$

D. $-5, -1$

O. $-7, 7$

H. 0

T. $-3, 7$

6	14	2		7	13	1	8	10		11	5	9	15	3	12	4
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4.4 Puzzle Time

What Does A Magician Need When He Loses His Rabbit?

Write the letter of each answer in the box containing the exercise number.

Complete the square for the expression. Then factor the trinomial.

1. $x^2 - 12x$
2. $x^2 + 18x$
3. $x^2 + 7x$
4. $x^2 - 3x$

Solve the equation by completing the square. Round your solutions to the nearest hundredth, if necessary.

5. $x^2 + 12x = 13$
6. $x^2 - 8x = -7$
7. $x^2 + 6x = 16$
8. $x^2 - 4x - 17 = 0$
9. $3x^2 + 30x + 66 = 0$
10. $-4x^2 - 32x + 80 = 0$

Determine whether the quadratic function has a maximum or minimum value. Then find the value.

11. $y = x^2 - 6x + 4$
12. $y = -x^2 - 14x - 36$
13. A ball is thrown from a height of 5 feet with an initial velocity of 32 feet per second. The height h (in feet) after t seconds is represented by the function $h = -16t^2 + 32t + 5$. Find the maximum height (in feet) of the ball.

Answers

R. $\left(x + \frac{7}{2}\right)^2$

A. $-8, 2$

S. $(x - 6)^2$

T. 21

R. 1, 7

E. $-2.58, 6.58$

O. $\left(x - \frac{3}{2}\right)^2$

R. minimum; $(3, -5)$

E. $-13, 1$

H. maximum; $(-7, 13)$

R. $-6.73, -3.27$

A. $(x + 9)^2$

E. $-10, 2$

7		12	2	9	5		11	8	1	13	4	6	10	3
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Puzzle Time

What Do Elephants Take When They Go Away On A Long Trip?

Write the letter of each answer in the box containing the exercise number.

Determine the number of real solutions of the equation.

1. $6x^2 = 6x - 11$

- C. one D. two E. none

2. $-\frac{1}{3}x^2 + 5x = -12$

- T. one U. two V. none

Find the number of x -intercepts of the graph of the function.

3. $y = -x^2 + 7x + 15$

- G. one H. two I. none

4. $y = 3x^2 - 18x + 27$

- S. one T. two U. none

Solve the equation using the Quadratic Formula. Round your solutions to the nearest tenth, if necessary.

5. $x^2 - 9x + 20 = 0$

6. $x^2 + 6x + 5 = 0$

7. $x^2 - 12x + 32 = 0$

8. $3x^2 - 5x + 2 = 0$

9. $1 - 10x = -25x^2$

10. $x^2 + 4x = 7$

11. $8x^2 - 9 = -3x$

Answers	
T.	-5, -1
R.	$\frac{1}{5}$
K.	$\frac{2}{3}, 1$
T.	4, 5
I.	0.9, -1.3
N.	-5.3, 1.3
R.	4, 8

6	3	1	11	7		5	9	2	10	8	4
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4.6 Puzzle Time

What Is The Difference Between A Pterodactyl And A Parrot?

A	B	C	D	E	F
G	H	I	J	K	L
M	N				

Complete each exercise. Find the answer in the answer column. Write the word under the answer in the box containing the exercise letter.

-48 <i>i</i> THE
3 <i>i</i> √10 KNOW
25 <i>i</i> YOU'D
16 <i>i</i> √5 DIFFERENCE
$x = -3; y = 2$ IF
50 ON
11 - <i>i</i> EVER

Find the square root of the number.

- A. $\sqrt{-625}$ B. $\sqrt{-90}$
 C. $-4\sqrt{-144}$ D. $8\sqrt{-20}$

Find the values of *x* and *y* that satisfy the equation.

- E. $-3x + 4i = 2yi + 9$ F. $20 - 5xi = \frac{1}{3}y + 35i$

Add, subtract, or multiply. Write the answer in standard form.

- G. $(8 - i) + (3 + i) - i$ H. $(12 + 7i) - (8 - 4i)$
 I. $4i(-2 + 7i)$ J. $(4 - 6i)(4 + 6i)$

Multiply the complex number by its conjugate.

- K. $2 - i$ L. $7 + i$
 M. $3 + 5i$ N. $-7 - 3i$

5 SIT
-28 - 8 <i>i</i> A
34 YOUR
58 SHOULDER
4 + 11 <i>i</i> LET
52 PTERODACTYL
$x = -7; y = 60$ YOU

4.7 Puzzle Time

What Do You Call An Ice Skater Who Chats On The Internet?

Write the letter of each answer in the box containing the exercise number.

Solve the equation using any method.

1. $(x + 8)^2 = 25$
2. $2x^2 - 12x + 6 = 0$
3. $x^2 - 8x + 15 = 0$
4. $x^2 - 45 = 0$
5. $3x^2 - x = 10$
6. $9x^2 + 79 = -18x$
7. $3x^2 = -4 + 8x$
8. $x^2 - 2x = 3$
9. $4x^2 + 8x + 80 = 0$
10. $-8 - 8x^2 = -31$

Write a function that represents the situation.

11. A baseball player hit a pitch from a height 3.5 feet above the ground with an initial velocity of 154 feet per second.
12. A diver springs upward from a diving board that is 9.8 feet above the water with an initial velocity of 5.7 feet per second.

Answers

- K. $x = 3, x = -1$
- C. $h = 154t^2 + 3.5$
- E. $h = -16t^2 + 154t + 3.5$
- N. $x = -\frac{5}{3}, x = 2$
- N. $x = 3 \pm \sqrt{6}$
- L. $x = 3, x = 5$
- I. $x = \pm 3\sqrt{5}$
- E. $x = \frac{-3 \pm i\sqrt{70}}{3}$
- S. $x = 2, x = \frac{2}{3}$
- A. $x = -1 \pm i\sqrt{19}$
- T. $x = \frac{\pm\sqrt{46}}{4}$
- O. $x = -3, x = -13$
- R. $h = -16t^2 + 5.7t + 9.8$
- W. $h = -16t^2 - 5.7t + 9.8$

1	2	3	4	5	6		7	8	9	10	11	12
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