PAP Algebra II - Spring Semester Exam Review 2017

Short Answer

Write a function $g$ whose graph represents the indicated transformation of the graph of $f$.

1. $f(x) = |x|; \text{ a horizontal shrink by a factor of } \frac{1}{3} \text{ followed by a translation 3 units to the left}$

Solve the equation.

2. $-2 \mid 7x - 1 \mid - 2 = -14$

Find the product.

4. $(-x^3 - 2x - 8)(5x^2 - 6x - 1)$

Find the sum.

3. $(3x^4 + 3x^3 - 6x^2 - 4) + (-9x^3 - 2x^2 + x + 8)$

5. $\frac{x^2(x - 3)}{(x - 5)} \cdot \frac{(x - 5)(x + 8)}{10x^2}$

Divide.

6. $(x^2 - 5x + 9) \div (x - 3)$

Evaluate the logarithm.

8. $\log_2 8$

Write a rule for $g$ that represents the indicated transformations of the graph of $f$.

9. $f(x) = \log_{\frac{1}{7}} x; \text{ translation 9 units up followed by a horizontal shrink by a factor of } \frac{1}{9}$

Rewrite the equation in logarithmic form.

7. $36^{1/2} = 6$
Solve the equation.

10. \( \ln(x + 9) = \ln(2x + 3) \)

Find the quotient.

11. \( \frac{5x}{7x + 35} \div \frac{x^2 - 2x}{x^2 + 3x - 10} \)

Find the sum.

12. \( \frac{12}{4x + 13} + \frac{26}{4x + 13} \)

Solve the equation.

13. \( \frac{6}{2 + x} = \frac{6}{4x + 8} \)

Find the square root of the number.

15. \( \sqrt{-192} \)

Find the zero(s) of the function.

14. \( g(x) = x^2 + x - 12 \)

16. A boy throws a ball into the air. The equation \( h = -16t^2 + 32t + 5 \) models the path of the ball, where \( h \) is the height (in feet) of the ball \( t \) seconds after it is thrown. How long is the ball in the air? Round your answer to the nearest tenth of a second.

Identify the focus, directrix, and axis of symmetry of the parabola.

17. \( y = \frac{1}{8}x^2 \)
18. A do-it-yourself website describes how to make a parabolic sound-collecting dish using a wok and a microphone that is attached at the focal point. You have a wok that is 24 inches wide and 12 inches deep, as shown below. Write an equation that represents the cross section of the wok. Then find the location of the microphone to the nearest tenth of an inch.

![Diagram of a parabolic sound-collecting dish]

19. Is \( x = 5 + 4i \) a solution of a quadratic equation \( x^2 + 41 = 20x \)? If not, identify the correct solution. Justify your answer by showing all work.

Solve the system.

20. \( x^2 + y^2 = 6 \)
\( x + 2y = 12 \)
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Answer Section

SHORT ANSWER

1. ANS:
   \[ g(x) = |3x + 3| \]
   PTS: 1      DIF: Level 1      REF: Algebra 2 Sec. 1.3
   KEY: writing functions representing transformations | transformation | combinations of transformations
   NOT: Example 4

2. ANS:
   \[ x = 1, \quad x = -\frac{5}{7} \]
   PTS: 1      DIF: Level 1      REF: Algebra 2 Sec. 1.4
   KEY: absolute value equation | solving absolute value equations
   NOT: Example 2

3. ANS:
   \[ 3x^4 - 6x^3 - 8x^2 + x + 4 \]
   PTS: 1      DIF: Level 1      REF: Algebra 2 Sec. 5.2
   KEY: adding polynomials | polynomial
   NOT: Example 1

4. ANS:
   \[ -5x^3 + 6x^4 - 9x^3 - 28x^2 + 50x + 8 \]
   PTS: 1      DIF: Level 1      REF: Algebra 2 Sec. 5.2
   KEY: multiplying polynomials | polynomial
   NOT: Example 3

5. ANS:
   \[ \frac{(x - 3)(x + 8)}{10}, \quad x \neq 5, \quad x \neq 0 \]
   PTS: 1      DIF: Level 1      REF: Algebra 2 Sec. 8.3
   KEY: multiplying rational expressions | rational expression
   NOT: Example 3
6. ANS:
\[ x - 2 + \frac{3}{x - 3} \]

PTS: 1  DIF: Level 1  REF: Algebra 2 Sec. 5.3
KEY: dividing polynomials | polynomial | synthetic division  NOT: Example 2

7. ANS:
\[ \log_{36} 6 = \frac{1}{2} \]

PTS: 1  DIF: Level 1  REF: Algebra 2 Sec. 7.3
KEY: rewriting exponential equations in logarithmic form  NOT: Example 2

8. ANS:
\[ \frac{3}{2} \]

PTS: 1  DIF: Level 1  REF: Algebra 2 Sec. 7.3
KEY: evaluating logarithms | logarithmic expression  NOT: Example 3

9. ANS:
\[ g(x) = \log_{1/7} (9x + 9) \]

PTS: 1  DIF: Level 2  REF: Algebra 2 Sec. 7.4
KEY: writing transformations of logarithmic functions | logarithmic function | transformation  NOT: Example 6

10. ANS:
\[ x = 6 \]

PTS: 1  DIF: Level 1  REF: Algebra 2 Sec. 7.6
KEY: logarithmic equations | solving logarithmic equations  NOT: Example 3

11. ANS:
\[ \frac{5}{7}, x \neq -5, x \neq 0, x \neq 2 \]

PTS: 1  DIF: Level 1  REF: Algebra 2 Sec. 8.3
KEY: dividing rational expressions | rational expression  NOT: Example 5

12. ANS:
\[ \frac{38}{4x + 13} \]

PTS: 1  DIF: Level 1  REF: Algebra 2 Sec. 8.4
KEY: adding or subtracting rational expressions  NOT: Example 1

13. ANS:
\[ x = -2 \]

PTS: 1  DIF: Level 1  REF: Algebra 2 Sec. 8.5
KEY: solving rational equations | rational equations  NOT: Example 1
14. ANS: 
\[ x = -4 \text{ and } x = 3 \]

PTS: 1  DIF: Level 1  REF: Algebra 2 Sec. 4.1
KEY: finding zero(s) of quadratic functions | quadratic function | zero of a function | quadratic equation in one variable  NOT: Example 4

15. ANS: 
\[ 8i\sqrt{3} \]

PTS: 1  DIF: Level 1  REF: Algebra 2 Sec. 4.2
KEY: finding square roots of numbers  NOT: Example 1

16. ANS: 
about 1.9 sec

PTS: 1  DIF: Level 1  REF: Algebra 2 Sec. 4.4
KEY: quadratic equation | application  NOT: Example 6-1

17. ANS:
focus: \((0, -2)\), directrix: \(y = 2\), axis of symmetry: \(y\)-axis

PTS: 1  DIF: Level 1  REF: Algebra 2 Sec. 3.3
KEY: focus | directrix | parabola | axis of symmetry  NOT: Example 2

18. ANS: 
\[ x = \frac{1}{12} y^2; \text{ 3 in. to the right of the vertex} \]

PTS: 1  DIF: Level 3  REF: Algebra 2 Sec. 3.3
KEY: focus | application | parabola | vertex of a parabola | axis of symmetry  NOT: Example 5-3
19. **ANS:**
   No because the right side does not equal the left side.
   
   \[(5 + 4i)^2 + 41 = 20(5 + 4i)\]
   
   \[(5 + 4i)(5 + 4i) + 41 = 20(5 + 4i)\]
   
   \[25 + 20i + 20i + 16i^2 + 41 = 100 + 80i\]
   
   \[25 + 20i + 20i - 16 + 41 = 100 + 80i\]
   
   \[50 + 40i = 100 + 80i\]

   **PTS:** 1  **DIF:** Level 2  **REF:** Algebra 2 Sec. 4.2
   **KEY:** application | complex number  **NOT:** Example 4-3

20. **ANS:**
   no solution

   **PTS:** 1  **DIF:** Level 1  **REF:** Algebra 2 Sec. 4.5
   **KEY:** solving systems of nonlinear equations by substitution | system of nonlinear equations | solving systems of nonlinear equations  **NOT:** Example 4