Name: Answer Key Class: _____ Date: _____

Algebra 2 Spring Final Review

Indicate the answer choice that best completes the statement or answers the question.

___ 1. Find $(f - g)(x)$ for $f(x) = x^2 + 8x$ and $g(x) = 3x + 5$.

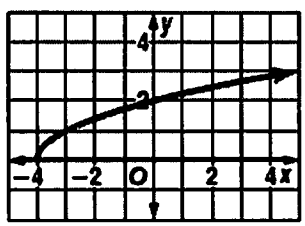
a. $-x^2 - 5x + 5$ b. $x^2 + 5x + 5$ (c.) $x^2 + 5x - 5$ d. $x^2 + 11x + 5$

___ 2. If $f(x) = x^2 - 3$, and $g(x) = 2x - 1$, find $[g \circ f](x)$.

a. $2x^3 - x^2 - 6x + 3$ b. $x^2 + 2x - 4$

c. $4x^2 - 4x - 2$ (d.) $2x^2 - 7$

___ 3. State the domain and range of the function graphed below.



a. $D = \{x \mid x > -4\}$, $R = \{y \mid y > 0\}$ (b.) $D = \{x \mid x \geq -4\}$, $R = \{y \mid y \geq 0\}$

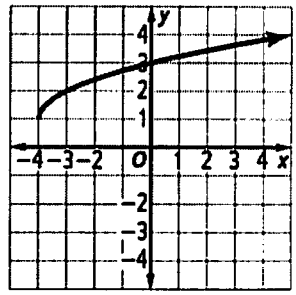
c. $D = \{x \mid x \geq -4\}$, $R = \{y \mid y \leq 0\}$ d. $D = \{x \mid x > -4\}$, $R = \{y \mid y < 0\}$

___ 4. Find the inverse of $f(x) = 3 + 5x$.

a. $f^{-1}(x) = 5 + 3x$ b. $f^{-1}(x) = \frac{3 + 5x}{5}$

(c.) $f^{-1}(x) = \frac{x - 3}{5}$ d. $f^{-1}(x) = -3 + \frac{1}{5}x$

___ 5. Which square root function is represented by the graph?



a. $f(x) = \sqrt{x - 4} + 1$ (b.) $f(x) = \sqrt{x + 4} + 1$

c. $f(x) = \sqrt{x - 1} + 4$ d. $f(x) = \sqrt{x + 1} + 4$

___ 6. A correct step in the solution of the equation $(5z - 1)^{\frac{1}{3}} - 3 = 1$ is _____.

a. $5z - 1 = 4^{\frac{1}{3}}$ b. $(5z - 1) - 9 = 3$

c. $(5z - 1) - 27 = 1$ (d.) $5z - 1 = 64$

___ 7. Solve $\sqrt{3x + 6} - 1 \geq 5$.

a. $x \geq 0$ b. $-2 \leq x \leq 10$ (c.) $x \geq 10$ d. $x \geq -2$

___ 8. The approximate time t in seconds that it takes an object to fall a distance of d feet is given by $t = \sqrt{\frac{d}{16}}$. How far will the object fall in 8 seconds?

a. 64 ft b. 128 ft (c.) 1024 ft d. 16,384 ft

___ 9. Which function represents exponential *growth*?

(a.) $y = \frac{1}{20}\left(\frac{5}{2}\right)^x$ b. $y = \frac{16}{(0.4)^x}$ c. $y = 20\left(\frac{1}{8}\right)^x$

___ 10. Solve $4^{2x + 7} = 32^{x + 3}$.

a. -2 (b.) -1 c. 1 d. 2

___ 11. Solve $\left(\frac{1}{81}\right)^t = 243^{t - 2}$.

a. $\frac{9}{2}$ (b.) $\frac{10}{9}$ c. $\frac{2}{9}$ d. $\frac{9}{10}$

12. Solve $64^x < 32^{x+2}$.

a. $\{x \mid x > -10\}$ b. $\{x \mid x < -10\}$ c. $\{x \mid x > 10\}$ d. $\{x \mid x < 10\}$

$\{x \mid x < 10\}$

13. Write the equation $\log_{243} 81 = \frac{4}{5}$ in exponential for

a. $81^{\frac{4}{5}} = 243$ b. $243^{\frac{4}{5}} = 81$ c. $\left(\frac{4}{5}\right)^{81} = 243$

14. Evaluate $9^{\log_9 54}$.

a. $\log_9 54$ b. 54 c. 6 d. 486

15. Solve $\log_{\frac{1}{8}} x = -1$.

a. 8 b. -8 c. 0 d. $-\frac{1}{8}$

16. Solve $\log_2 (7x - 3) \geq \log_2 (x + 12)$.

a. $\left\{x \mid x \leq \frac{5}{2}\right\}$ b. $\left\{x \mid x \leq -\frac{5}{2}\right\}$ c. $\left\{x \mid x \geq$ ⋮

a. $\left\{x \mid x \geq \frac{5}{2}\right\}$

17. Solve $\log_3 a + \log_3 (a - 8) = 2$.

a. 8 b. 5 c. 9 d. $-1, 9$

18. Solve $3^{5x-1} \leq 30$. Round to the nearest ten-thous

a. $\{x \mid x \leq 0.4000\}$ b. $\{x \mid x \leq 0.8192\}$ c. $\{x \mid x \leq 1.8000\}$ d. $\{x \mid 3.0$

19. Suppose you deposit \$1000 in an account paying 4 interest, compounded continuously. Use $A = Pe^{rt}$ t balance after 10 years.

a. \$1491.82 b. \$5459.82 c. \$1040.81 d.

20. Solve $\ln (x + 2) = 3$.

a. 22.0855 b. 18.0855 c. 20.0855 d. $-0.9($

21. Solve $e^{-9x} \leq 6$.

a. $\{x \mid x \geq -1.8122\}$ b. $\{x \mid x \geq -0.08646\}$

c. $\{x \mid x \geq 1.7918\}$ d. $\{x \mid x \geq -0.1991\}$

22. **CHEMISTRY** A particular compound decays according to the equation $y = ae^{-0.0736t}$, where t is in days. Find the half-life of this compound.

a. about 9.1 days b. about 9.4 days c. about 6.8 days d. about 7.4 days

23. **FOOD PRICES** At a wholesale food distribution center, the price of sugar has increased 3.6% annually since 1985. Suppose sugar cost \$0.43 per pound in 1985 and this growth continues. What will a pound of sugar cost in 2022? Use $y = a(1 + r)^t$ and round to the nearest cent.

a. \$1.21 b. \$1.59 c. \$2.42 d. \$3.30

24. For what value(s) of x is the expression $\frac{x^2 - 4x + 4}{2x^2 - 3x - 2}$ undefined?

a. $-\frac{1}{2}, 0, 2$ b. $-\frac{1}{2}, 2$ c. $-2, \frac{1}{2}$ d. $-\frac{1}{2}$

Simplify each expression.

25. $\frac{t^2 - 2t - 3}{t^2 - 1} \cdot \frac{3t - 3}{t^2 - 4t + 3}$

a. $\frac{t^2 - 6t + 9}{3t - 3}$ b. $\frac{3(t - 3)}{t^2 - 1}$ c. 3 d. $\frac{3}{t - 1}$

26. $\frac{m + 2f}{6} + \frac{m^2 - 4f^2}{10}$

a. $\frac{5}{3(m - 2f)}$ b. $\frac{5}{3(m + 2f)}$ c. $\frac{4}{m - 2f}$ d.

27. $\dfrac{\dfrac{3b^2 - 12}{6b^2 + 12b}}{\dfrac{5b - 10}{10b^2 + 20b}}$

a. $\frac{b + 2}{b - 2}$ b. $b - 2$ c. $2b + 4$ d. $b + 2$

28. $\frac{30}{m^2 - 25} + \frac{3}{m - 5}$

a. $\frac{3m + 25}{m^2 - 25}$ b. $\frac{33}{m^2 - 25}$ c. $\frac{3}{m - 5}$ d. $\frac{3($

$\frac{3(m+15)}{(m+5)(m-5)}$

29. $\frac{7}{m - 6} - \frac{m}{6 - m}$

a. $\frac{7 - m}{m - 6}$ b. $\frac{m + 7}{m - 6}$ c. $\frac{m - 7}{m - 6}$ d. $\frac{7}{6 - m}$

30. Find the LCM of $7m - 21$ and $14m - 42$.

a. $m - 3$ b. $98(m - 3)$ c. $7(m - 3)$ d. $14(m - 3)$

___ 31. What is the LCM of $t^2 - t - 12$ and $t^2 + 2t - 24$?

(a.) $(t + 3)(t - 4)(t + 6)$ b. $(t - 3)(t - 4)(t - 6)$

c. $(t - 3)(t + 4)(t + 6)$ d. $(t + 3)(t + 4)(t - 6)$

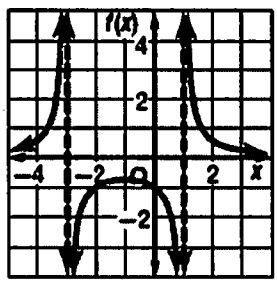
___ 32. Determine the equations of any vertical asymptotes of the graph of $f(x) = \frac{2x + 3}{x^2 + 2x - 3}$.

a. $x = -1$ b. $x = 3$ (c.) $x = -3, x = 1$ d. $f(x) = 2$

___ 33. Determine the values of x for any points of discontinuity in the graph of $f(x) = \frac{x + 3}{x^2 + 5x + 6}$.

(a.) $x = -3$ b. $x = 3$ c. $x = -2, x = -3$ d. $x = -2$

___ 34. Which rational function is graphed?



a. $f(x) = \frac{x - 3}{x - 1}$ b. $f(x) = \frac{x - 3}{x + 1}$ (c.) $f(x) = \frac{3}{(x+3)(x-1)}$

___ 35. Solve $\frac{n}{n - 3} + n = \frac{7n - 18}{n - 3}$.

a. 3 (b.) 6 c. 3, 6 d. −3, 6

___ 36. Solve $7 - \frac{3}{m} > \frac{18}{m}$.

(a.) $m < 0$ or $m > 3$ b. $0 < m < 3$ c. $m > 3$ d. $m < 0$

___ 37. **FOOD** A cafeteria manager wants to know the purchasing habits of his customers. This situation calls for a _____.

a. survey

b. experiment

(c.) observational study

d. control group

From a survey of 450 employees, find the following population proportions.

___ 38. 342 employees prefer a bonus over extra vacation days

a. 0.24

b. 0.34

c. 0.45

(d.) 0.76

___ 39. 369 employees prefer 401K options over shares in a company

a. 0.18

b. 0.36

(c.) 0.82

d. 0.92

___ 40. A survey is conducted to determine if citizens will attend a fire safety meeting. The result of the 105 citizens surveyed showed that 33% will attend the fire safety meeting. Find the margin of error.

a. ±1.0%

b. ±1.5%

(c.) ±9.8%

d. ±33%

Which of these could you use to simulate the outcome of each event?
Choose each answer from:
A using a spinner divided into 5 equal parts
B tossing a coin 5 times
C drawing, without replacement, from a bag of 5 marbles, each a different color
D rolling a die 5 times

___ 41. choosing to stay home or go to the park during the week when going to a park and staying home are equally likely

a. A
(b) B
c. C
d. D

___ 42. the results of a spelling bee with 5 participants if each of the people are equally likely to win

a. A
b. B
(c) C
d. D

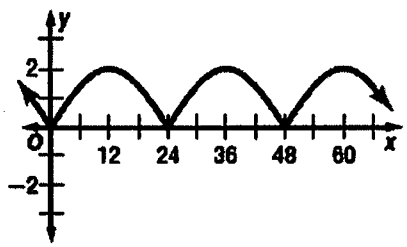
___ 43. Find the exact value of cot (–315°).

(a) 1 b. $\sqrt{2}$ c. $\frac{\sqrt{2}}{2}$ d. 2

___ 44. Find the exact value of $\sin\left(-\frac{\pi}{6}\right)$.

(a) $-\frac{1}{2}$ b. $-\frac{\sqrt{3}}{2}$ c. $-\frac{\sqrt{2}}{2}$ d. $\frac{\sqrt{2}}{2}$

___ 45. Determine the period of the function.



a. 60 b. 2 c. 48 (d) 24

___ 46. Find the period of $y = 2 \sin \frac{2}{5}\theta$.

(a) 900° b. 450° c. 144° d. 72°

___ 47. Find the vertical shift of $y = -3 + \tan \frac{1}{2}\left(0 + \frac{\pi}{2}\right)$.

(a) –3 b. $\frac{1}{2}$ c. $-\frac{\pi}{2}$ d. $\frac{\pi}{2}$

Find the exact value of each expression if $0° < \theta < 90°$.

___ 48. If $\cot \theta = \frac{1}{2}$, find $\sin \theta$.

a. $\frac{2}{5}$
b. $\frac{\sqrt{5}}{5}$
(c) $\frac{2\sqrt{5}}{5}$
d. $\frac{4}{5}$

Find the exact value of each expression if $180° < \theta < 270°$.

___ 49. If $\sin \theta = -\frac{15}{17}$, find $\sec \theta$.

(a) $-\frac{17}{8}$
b. $\frac{17}{8}$
c. $-\frac{17}{8}$
d. $-\frac{17}{8}$

___ 50. If $\csc\theta = -\frac{3}{2}$, find $\cot\theta$.

a. $-\frac{5}{2}$

(b) $\frac{\sqrt{5}}{2}$

c. $-\frac{\sqrt{5}}{2}$

d. $\frac{5}{4}$

Find the exact value of each expression if $270° < \theta < 360°$.

___ 51. If $\cos\theta = \frac{1}{3}$, find $\cot\theta$.

a. $\frac{\sqrt{2}}{4}$

b. $-\frac{\sqrt{2}}{2}$

c. $-\frac{\sqrt{2}}{16}$

(d) $-\frac{\sqrt{2}}{4}$

Simplify each expression.

___ 52. $\csc\theta \tan\theta$

(a) $\sec\theta$

b. $\cos\theta$

c. $\csc\theta$

d. $\cot\theta$

___ 53. $\cot^2\theta + 1$

a. $\csc\theta$

b. $\cos^2\theta$

(c) $\csc^2\theta$

d. $\sec^2\theta$

___ 54. $\frac{\csc\theta}{1-\sin\theta} - \frac{\cos\theta}{1+\sin\theta}$

a. $\frac{2\tan\theta}{\tan^2}$

(b) $2\tan\theta$

c. 0

d. $2\cot\theta$

___ 55. Paula chooses a number from 1 to 10 and flips a coin. What is the probability of choosing an even number and the coin landing on heads?

a. $\frac{1}{2}$

b. $\frac{1}{5}$

c. $\frac{9}{20}$

(d) $\frac{1}{4}$

___ 56. The table shows how many players won a prize at and duck pond game during a day at a festival. Fir a player did not win a prize given that he or she pl dart throw game.

Game	Prize	
Dart Throw	50	
Duck Pond	53	

(a) $\frac{47}{57}$

b. $\frac{235}{627}$

c. $\frac{235}{524}$

d. $\frac{524}{627}$

Determine whether the events are *mutually exclusive* or *not mutually exclusive*. Then find the probability.

57. Jasmine has 4 red bracelets, 5 green bracelets, and 2 yellow bracelets. If she selects a bracelet at random from her collection, what is the probability that it is red or yellow?

Bracelet can't be red and yellow

$\frac{4}{11} + \frac{2}{11} = \frac{6}{11}$

Mutually exclusive

58. There were 150 customers at a car wash last Saturday. Of these, 112 customers had their cars washed, 48 had the interiors detailed, and 16 had both their cars washed and the interiors detailed. What is the probability that a randomly selected customer from last Saturday had their car washed or their interior detailed?

can have car washed and interior detailed

$\frac{112}{150} + \frac{48}{150} - \frac{16}{150} = \frac{144}{150} = \frac{24}{25}$

Not Mutually Exclusive

59. A coin jar contains 5 pennies, 8 nickels, 4 dimes, and 6 quarters. Suppose a coin is selected at random, replaced, and then another coin is selected at random. Are these events independent or dependent? What is the probability of selecting a nickel first and a quarter second?

$\frac{8}{23} \times \frac{6}{23} = \frac{48}{529}$

events are independent

60. A cookie jar contains 7 chocolate chip cookies, 10 oatmeal raisin cookies, and 8 peanut butter cookies. Hannah selects a cookie at random, does not replace it, and then selects another cookie. Are these events independent or dependent? What is the probability that she selects two oatmeal raisin cookies?

$\frac{10}{25} \times \frac{9}{24} = \frac{3}{20}$

Dependent. Outcome of first affects 2nd

61. **PAINTING** Alice can paint a room in 8 hours. Her assistant can paint the same room in 12 hours. How long will it take if the two of them work together?

4.8 hrs

62. Find the inverse of $f(x) = 5x + 10$.

$f^{-1}(x) = \frac{1}{5}x - 2$

63. Determine whether $f(x) = 5x - 3$ and $g(x) = \frac{x+3}{5}$ are inverse functions.

yes

64. Solve $\sqrt[3]{3m+1} = 4$.

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65. Solve $4 - \sqrt{5y-10} \leq -1$.

$y \geq 7$