

STUDENT NAME _____

Algebra II

Simulated SOL Test Practice

Developed with Region 1 school divisions in collaboration with Henrico, Chesterfield, Colonial Heights and Hanover counties

REPORTING CATEGORY: EXPRESSIONS AND OPERATIONS (1 – 13)

1 Simplify the expression completely.

$$\frac{\frac{6x^2 - 6}{8x^2 + 8x}}{\frac{3 - 3x}{4x^2 + 4x}}$$

- A** $-x - 1$
- B** $x + 1$
- C** -1
- D** 1

2 Simplify $\sqrt{\frac{147m^5n^7}{441z^6}}$ completely.

- A** $\frac{m^2n^3\sqrt{mn}}{3z^6}$
- B** $\frac{3mn\sqrt{7m^2n^3}}{21z^3}$
- C** $\frac{7mn\sqrt{3m^3n^5}}{21z^3}$
- D** $\frac{m^2n^3\sqrt{3mn}}{3z^3}$

3 If $9 - i$ is the sum of two complex numbers, and one of the binomials is $12 - 5i$, which of the following represents the other binomial?

A $21 + 4i$

B $-3 - 6i$

C $21 - 6i$

D $-3 + 4i$

4 Simplify the algebraic expression completely.

$$\frac{b^2}{4a^2 - 4ab + b^2} + \frac{b - a}{b - 2a}$$

A $\frac{5a^2 - 3ab - 3b^2}{(2a - b)}$

B $\frac{2a^2 - 3ab + 2b^2}{(2a - b)^2}$

C $\frac{a^2 + 3ab + b^2}{(2a - b)^2}$

D $\frac{3ab - 2a^2}{(2a - b)^2}$

5 Simplify the algebraic expression completely.

$$\sqrt[3]{54x^4y^6} - \sqrt[3]{24x^3y^9} + \sqrt[3]{128x^4y^6}$$

A $x^2y^3\sqrt{6} + 8x^2y^3\sqrt{2} - 4xy^4\sqrt{6xy}$

B $7xy^2\sqrt[3]{2x} - 2xy^3\sqrt[3]{3}$

C $7x^2y^4\sqrt[3]{2x} - 2xy^3\sqrt[3]{3}$

D $\sqrt[3]{158x^5y^3}$

6 Which of the following is a factor of $8x^3 - 34x^2 - 30x$?

A $(x^2 - 3)$

B $(4x + 3)$

C $(4x - 5)$

D $(x + 5)$

7 Simplify $(2\sqrt{3x^5} - 2\sqrt{y})^2$.

A $12x^5 - 8x^2\sqrt{3xy} + 4y$

B $12x^5 - 16x^4\sqrt{3xy} + 4y^2$

C $4x^4\sqrt{3x} - 4x^2\sqrt{6xy} + 4\sqrt{y}$

D $12x^5 + 4y$

8 Which of the following are equivalent to i^{63} ?

I $-i$	II i	III i^{12}
IV i^{15}	V i^4	

- A** II only
- B** I and IV only
- C** III and V only
- D** II, IV and V only

9 Determine all expressions equivalent to $(\sqrt{6x^{10}y^3})^5$.

I $6^{\frac{1}{5}}x^2y^{\frac{3}{5}}$	II $6^{\frac{2}{5}}x^4y^{\frac{6}{5}}$	III $(6x^{10}y^3)^{\frac{5}{2}}$
IV $(6x^{10}y^3)^{\frac{2}{5}}$	V $6^{\frac{5}{2}}x^{25}y^{\frac{15}{2}}$	

- A** I, II and IV only
- B** I, III and V only
- C** III and V only
- D** III only

10 Simplify $\frac{8a^3 - b^3}{8a^2 - 26a + 15} \cdot \frac{4a^2 + 21a - 18}{4a^2 - b^2}$ completely

A $\frac{(a+6)(4a^2 + 2ab + b^2)}{(2a-5)(2a+b)}$

B $\frac{2(a-3)(4a^2 + 2ab + b^2)}{(4a-5)(2a+b)}$

C $\frac{(a+6)(2a-b)}{(2a-5)}$

D $\frac{(a+6)(2a+b)}{(2a-5)}$

11 Which of the following expressions correctly illustrates the Inverse Property of Multiplication?

A $5\sqrt{x} - 2(1 - 7\sqrt{x}) = 5\sqrt{x} - 2 + 14\sqrt{x}$

B $\frac{3-2i}{4+9i} \cdot \frac{4-9i}{4-9i} = \frac{-6-35i}{117}$

C $2x^2(3\sqrt{x} \cdot 4) = (2x^2 \cdot 3\sqrt{x})4$

D $\frac{5-i}{2+7i} \cdot \frac{2+7i}{5-i} = 1$

12 Simplify $\frac{2x-6}{x^2-9} - \frac{x}{x+3}$ completely.

A $\frac{-x^2+5x-6}{(x+3)(x-3)}$

B $\frac{-x+2}{x^2-x-3}$

C $\frac{x-6}{x^2-9}$

D $\frac{-x+2}{x+3}$

13 Perform the indicated operation and simplify $(7-6i)(3+2i)$.

A $33-4i$

B $33-32i$

C $9-4i$

D $9+32i$

REPORTING CATEGORY: EQUATIONS AND INEQUALITIES (14 – 25)

14 Solve $2|3x - 5| - 4 = 12$.

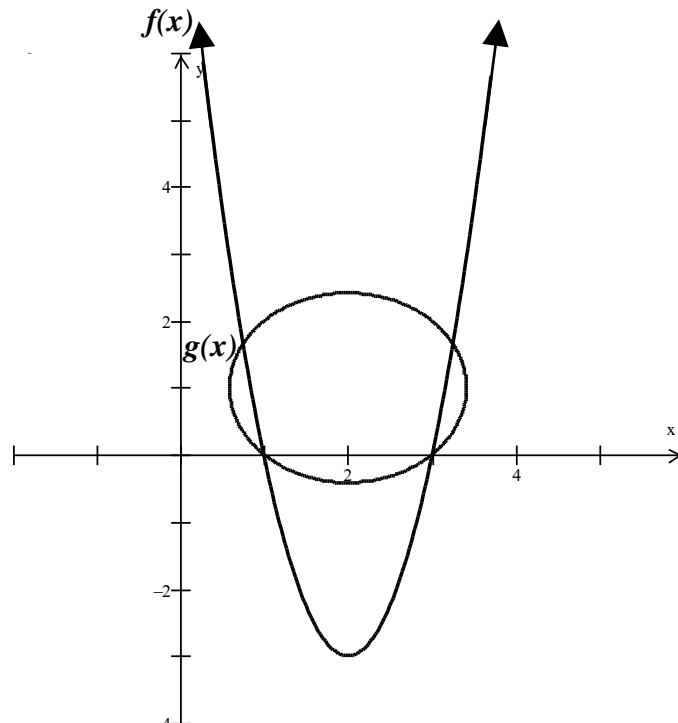
A $\{ \}$

B $\left\{ \frac{13}{3} \right\}$

C $\left\{ -\frac{13}{3}, \frac{13}{3} \right\}$

D $\left\{ -1, \frac{13}{3} \right\}$

15 The graphs of functions $f(x)$ and $g(x)$ are shown in the graph to the right. How many solutions does the system have?



A None

B One

C Two

D Four

16 Solve $\frac{4}{x+1} - \frac{1}{x} = 1$ over the real numbers.

A $\{ \}$

B $\{0\}$

C $\{1\}$

D $\{-1, 1\}$

17 Solve $\frac{1}{2}|3-x| + 11 = 4$.

A $\{ \}$

B $\{17\}$

C $\{-17\}$

D $\{-11, 17\}$

18 Solve $5 - 2(3x^2 - 2x) = x^2 + 7 - 2x^2$

A $\left\{ \frac{-4 \pm i\sqrt{6}}{5} \right\}$

B $\left\{ \frac{-4 \pm \sqrt{6}}{5} \right\}$

C $\left\{ \frac{2 \pm i\sqrt{6}}{5} \right\}$

D $\left\{ \frac{2 \pm \sqrt{6}}{5} \right\}$

19 Solve $18 > \frac{2}{3}|6 + x| + 4$.

A $\{x \mid x < 15\}$

B $\{x \mid -27 < x < 15\}$

C $\{x \mid x < -27\} \cup \{x \mid x > 15\}$

D $\{x \mid x \in \mathbb{R}\}$

20 A garden is currently 4 meters wide and 7 meters long. If the area of the garden is to be doubled by increasing the width and length by the same number of meters, find the new dimensions of the garden.

A 6.1 m x 9.1 m

B 6 m x 9.3 m

C 6.2 m x 9 m

D 8 m x 14 m

21 Which of the following is a solution for the system $y = x^2 + 7x - 6$?
 $y = 5(x - 2)^2 - 8$?

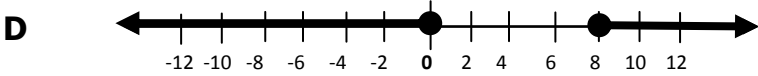
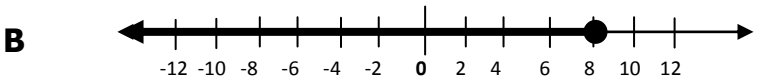
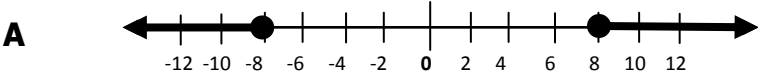
A $\{(6, 78)\}$

B $\left\{\left(\frac{3}{4}, -\frac{3}{16}\right)\right\}$

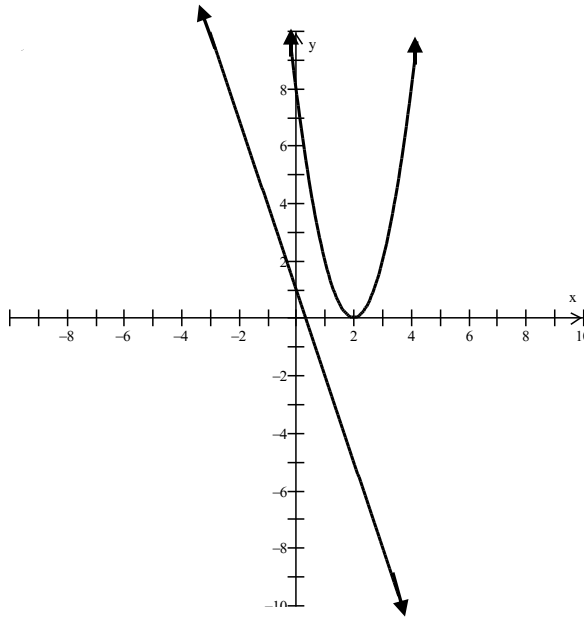
C $\left\{\left(\frac{13}{8}, \frac{513}{64}\right)\right\}$

D $\left\{\left(\frac{27}{8}, \frac{1857}{64}\right)\right\}$

22 Which of the following is the solution of $\left| \frac{3}{4}x - 3 \right| - 8 \geq -5$?



23 Determine the solution set for the system graphed.



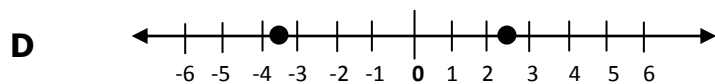
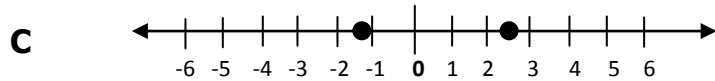
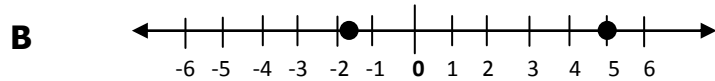
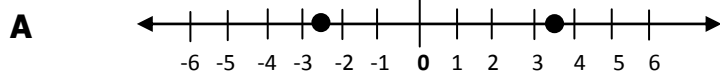
A $\left\{\left(\frac{1}{2}, 0\right), (2, 0), (0, 1), (0, 8)\right\}$

B $\{(0, 1), (0, 8)\}$

C $\left\{\left(\frac{1}{2}, 0\right), (2, 0)\right\}$

D \emptyset

24 Which of the following represents the solution to $3x^2 + 35 = 7x^2 - 4x$?



25 Solve $\sqrt{2m^2 - 10} - 4 = 4$

A $\{-\sqrt{37}, \sqrt{37}\}$

B $\{-\sqrt{13}, \sqrt{13}\}$

C $\{-\sqrt{5}, \sqrt{5}\}$

D $\{-3, 3\}$

26 A car is traveling at 26 meters per second (m/sec) begins to decelerate at -13 m/sec. After traveling 26 m, the driver brings the car to a complete stop. The equation $26 = 26t - \frac{13}{2}t^2$, can be used to represent the situation, where t is the time it takes to stop. How long did it take the driver to stop the car?

A 0.8 seconds

B 2 seconds

C 6.5 seconds

D 10.7 seconds

REPORTING CATEGORY: FUNCTIONS AND STATISTICS (27 – 50)

27 The population of a state is counted every ten years. In the table, populations are given for every twenty years. At the rate the state is growing, what would be the best estimate for the population in the year 2020?

Year	population (to nearest 1000)
1800	478,000
1820	639,000
1840	753,000
1860	993,000
1880	1,400,000
1900	1,894,000
1920	2,559,000
1940	3,572,000
1960	4,556,000
1980	5,880,000
2000	8,049,000

- A** 6, 970, 000
- B** 10, 600, 000
- C** 16, 000, 000
- D** 100, 600, 000

28 Evaluate $\sum_{n=1}^{\infty} \left(-\frac{2}{3}\right)^{n-1}$.

A -2

B $-\frac{2}{5}$

C $\frac{3}{5}$

D $\frac{2}{3}$

29 Which of the following best describes the parent function of

$$f(x) = -\frac{1}{2}(x-2)^3 + 3?$$

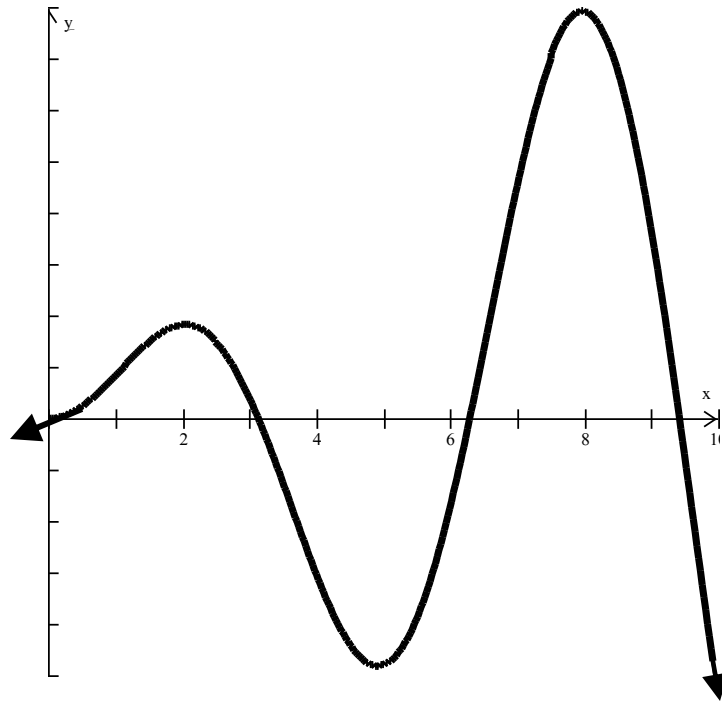
A $f(x) = (x-2)^3$

B $f(x) = x^3$

C $f(x) = x^5$

D $f(x) = x^2$

30 Determine the intervals on which the function is decreasing.



- A** $\{x: x < 2\} \cup \{x: 5 < x < 8\}$
- B** $\{x: 2 < x < 5\} \cup \{x: x > 8\}$
- C** $\{y: 0 < y < 2\} \cup \{y: -5 < y < 8\}$
- D** $\{y: 2 < y < -5\} \cup \{y: y > 8\}$

31 Simplify $f(g(x))$ in terms of x if $f(x) = x^2 - 1$ and $g(x) = 2x + 3$.

- A** $2x^2 + 1$
- B** $2x^2 + 6x + 5$
- C** $4x^2 + 10x + 5$
- D** $4x^2 + 12x + 8$

32 Determine which function has a range $\{y \mid y \leq 3\}$.

A $f(x) = -2x^3 + 3x^2 + x - 1$

B $f(x) = -2|x + 3| - 3$

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

D $f(x) = -2^{x-3}$

33 If you drop a ball and let it bounce repeatedly, the rebound height becomes smaller with each bounce. Using an initial height of 300 inches, the formula

for finding the rebound heights can be modeled by
$$\begin{cases} a_1 = 300 \\ a_n = \frac{a_{n-1}}{n} \end{cases} \text{ for } n \geq 2.$$

What is the approximate rebound height for a_4 , the 4th bounce?

A 2 inches

B 13 inches

C 50 inches

D 75 inches

34 Determine all possible functions with an asymptote $x = 4$.

I $f(x) = \frac{2x^2 + 3}{x^2 - 16}$	II $f(x) = x - 4 $	III $f(x) = \log(4 - x)$
IV $f(x) = \log(x + 4)$	V $f(x) = 2^x - 4$	VI $f(x) = x^2 + 8x + 16$

- A** I and III
- B** II and V
- C** III and IV
- D** IV and VI

35 Describe the end behavior of $f(x) = x^3 + 4x$.

- A** As x approaches infinity, $f(x)$ approaches negative infinity.
As x approaches negative infinity, $f(x)$ approaches infinity.
- B** As x approaches infinity, $f(x)$ approaches infinity.
As x approaches negative infinity, $f(x)$ approaches negative infinity.
- C** As x approaches infinity, $f(x)$ approaches negative infinity.
As x approaches negative infinity, $f(x)$ approaches negative infinity.
- D** As x approaches infinity, $f(x)$ approaches infinity.
As x approaches negative infinity, $f(x)$ approaches infinity.

36 Which of the following scenarios represents a combination?

- A** The arrangement of 8 books on a shelf.
- B** The number of ways 6 people can be seated at a round table if 2 people must be seated next to each other.
- C** The letters r, s, t, v, w are used to form 5-letter passwords for a security system.
- D** A seven person committee selected from the junior class.

37 The electrical resistance of a wire varies directly as its length and inversely as the square of its diameter. A wire with a length of 200 inches and a diameter of one-quarter of an inch has a resistance of 20 ohms. Find the electrical resistance in a 500 inch wire with the same diameter.

- A** 50 ohms
- B** 200 ohms
- C** 1250 ohms
- D** 5000 ohms

38 A race car driver increases her speed at a constant rate. What will be her speed after 20 seconds if her initial speed is 17 meters per second and her rate of acceleration is $\frac{20}{9}$ meters per second?

- A** 37.0 meters per second
- B** 57.0 meters per second
- C** 59.2 meters per second
- D** 61.4 meters per second

39 The useful life of a radial tire is normally distributed with a mean of 30,000 miles and a standard deviation of 5000 miles. The company makes 10,000 tires a month. What is the probability that if a radial tire is purchased at random, it will last between 20,000 and 35,000 miles?

- A 94%
- B 81%
- C 68%
- D 47%

40 Identify all x - and y - intercepts of $x^3 + x^2 - 4x - 4$.

- A $\{(\pm 2, 0), (-1, 0)(0, -4)\}$
- B $\{(2, 0), (-1, 0)(0, -4)\}$
- C $\{(\pm 2, 0), (0, -1)(-4, 0)\}$
- D $\{(-2, 0), (0, -1)(-4, 0)\}$

41 A polynomial function $P(x)$ has zeros $-1, 6,$ and $2i$. Which of the following represents the factors of $P(x)$?

- A $P(x) = (x - 1)(x + 6)(x + 2i)$
- B $P(x) = (x + 1)(x - 6)(x - 2i)$
- C $P(x) = (x - 1)(x + 6)(x + 2i)(x - 2i)$
- D $P(x) = (x + 1)(x - 6)(x - 2i)(x + 2i)$

42 The weights of eggs produced on a farm are normally distributed with a mean of 1.4 ounces and a standard deviation of 0.4 ounces. To be graded extra large, an egg must weigh at least 2 ounces. What is the probability that an egg from this farm will be graded extra large?

- A** 0.934
- B** 0.157
- C** 0.066
- D** 0.025

43 Determine the zeros of $f(x) = 4x^3 - 12x^2 - x + 3$.

- A** $\left\{-\frac{1}{2}, \frac{1}{2}, 3\right\}$
- B** $\left\{-3, -\frac{1}{4}, \frac{1}{4}\right\}$
- C** $\left\{-\frac{1}{2}i, \frac{1}{2}i, 3\right\}$
- D** $\left\{-3, -\frac{1}{4}i, \frac{1}{4}i\right\}$

44 Identify the domain of $f(x) = 2^{x-2}$.

- A** $\{y : y > 0\}$
- B** $\{x : x \in \mathfrak{R}\}$
- C** $\{y : y \in \mathfrak{R}\}$
- D** $\{x : x > 0\}$

45 Determine the inverse of $f(x) = (x+2)^2 - 3$, $x \geq -2$.

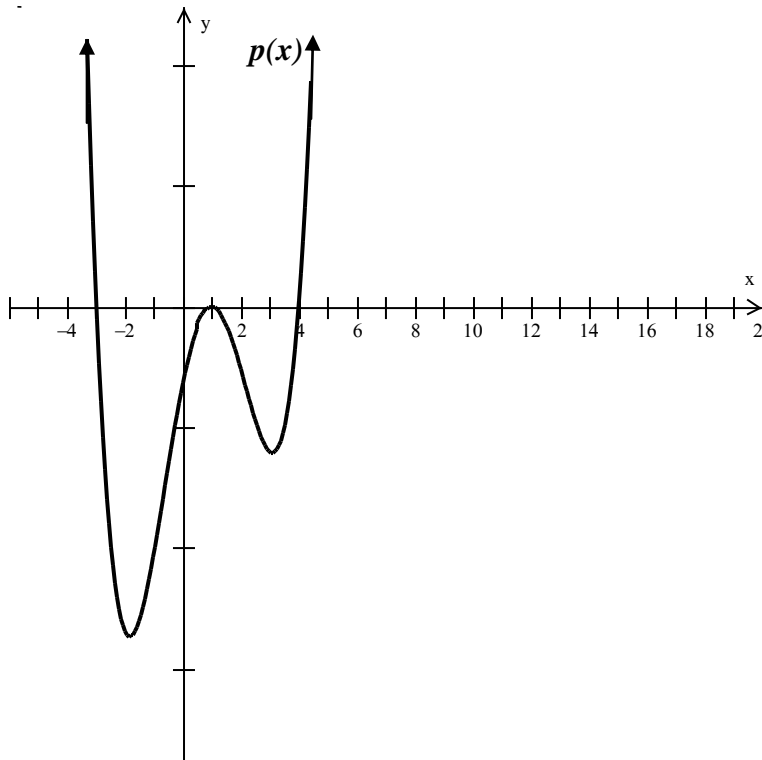
A $f^{-1}(x) = -2 + \sqrt{x+3}$

B $f^{-1}(x) = -3 + \sqrt{x-2}$

C $f^{-1}(x) = -2 + \sqrt{x-3}$

D $f^{-1}(x) = 3 + \sqrt{x+2}$

46 Identify the equation that best represents the graph $p(x)$.



A $p(x) = (x-3)(x+1)(x+4)$

B $p(x) = (x-3)(x+1)^2(x+4)$

C $p(x) = (x+3)(x-1)(x-4)$

D $p(x) = (x+3)(x-1)^2(x-4)$

47 Twelve runners are in a cross country race. How many different ways can they finish first, second, and third?

A 2200

B 1320

C 220

D 132

48 If a temperature is constant, the volume of a gas varies inversely as its pressure. A gas with a pressure of 150 pounds per square inch occupies a volume of 25 cubic feet. What is the constant of proportionality for this variation?

A 3750

B 673

C 6

D $\frac{1}{6}$

49 Determine the number of horizontal and vertical asymptotes for $f(x) = \frac{-3}{x^2 - 3x}$.

A 0

B 1

C 2

D 3

- 50** At 1,821 feet tall, the CN Tower in Toronto, Ontario, is the world's tallest self-supporting structure. A penny is dropped from the observation deck on top of the tower and falls to the ground. The table shows the penny's distance from the ground after various periods of time (in seconds) have passed. Where is the penny located after falling for a total of 10.5 seconds?

Time (seconds)	Distance (feet)
0	1821
2	1757
4	1565
6	1245
8	797
10	221

- A** 57 feet
- B** 140 feet
- C** 221 feet
- D** 300 feet