

Applied Algebra II Semester 2 Practice Exam A

1. Find the solution set of $x^2 + 2x = 9$.
- A. $\{-1 + \sqrt{10}, -1 - \sqrt{10}\}$
B. $\{-1 + i\sqrt{10}, -1 - i\sqrt{10}\}$
C. $\{-1 + 2i\sqrt{2}, -1 - 2i\sqrt{2}\}$
D. $\{-1 + 2\sqrt{2}, -1 - 2\sqrt{2}\}$
2. What is the simplified form of the expression $\sqrt{18} + \sqrt{200} + \sqrt{2} - \sqrt{8}$?
- A. $11\sqrt{2}$
B. $12\sqrt{2}$
C. $16\sqrt{2}$
D. $21\sqrt{2}$
3. Simplify $\frac{1}{b^4} \cdot b^{\frac{1}{4}}$.
- A. b
B. $b^{\frac{15}{4}}$
C. b^{-1}
D. 1
4. Let $f(x) = -x^{\frac{2}{3}}$ and $g(x) = x^{\frac{2}{3}}$.
Which expression is equivalent to $f(x) - g(x)$?
- A. 0
B. $2x^{\frac{2}{3}}$
C. $-2x^{\frac{2}{3}}$
D. $2x^{\frac{2}{3}}$
5. If $h(x) = 10x^2$ and $j(x) = x + 4$, what is $h(-2) + j(3)$?
- A. 47
B. 92
C. 139
D. 407
6. Let $f(x) = 2x^2$ and $g(x) = 4x - 3$.
Which expression is equivalent to $(f \circ g)(x)$?
- A. $2x^2 + 4x - 3$
B. $8x^3 - 6x^2$
C. $8x^2 - 3$
D. $32x^2 - 48x + 18$

Applied Algebra II Semester 2 Practice Exam A

7. Which is the inverse of the function $k(x) = 4x^2 - 16$ for $x \geq 0$?

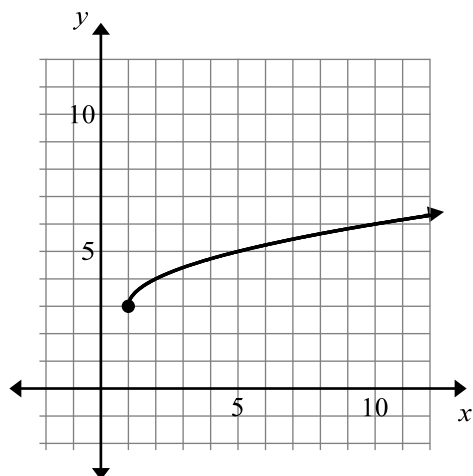
A. $k^{-1}(x) = \sqrt{\frac{x}{4}} + 4$

B. $k^{-1}(x) = \frac{\sqrt{x+4}}{2}$

C. $k^{-1}(x) = \sqrt{x+4}$

D. $k^{-1}(x) = \frac{\sqrt{x+16}}{4}$

8. What function is represented by this graph?



A. $y = \sqrt{x+1} + 3$

B. $y = \sqrt{x+3} + 1$

C. $y = \sqrt{x-1} + 3$

D. $y = \sqrt{x+3} - 1$

9. Solve for x : $\sqrt{5x-3} - 12 = -4$

A. $x = -25$

B. $x = \frac{11}{5}$

C. $x = \frac{31}{5}$

D. $x = \frac{67}{5}$

10. The volume V of a sphere with radius r is given by $V = \frac{4}{3}\pi r^3$. If a spherical hot air balloon has a volume of 12,000 cubic feet, what is the radius of the balloon?

A. $\sqrt[3]{\frac{9000}{\pi}}$ ft

B. $\sqrt[3]{\frac{3000}{\pi}}$ ft

C. $\sqrt[3]{\frac{1000}{\pi}}$ ft

D. $\sqrt[3]{\frac{500}{\pi}}$ ft

11. Simplify the expression $[(1-2i)+(1+i)](-3+i)$ where $i^2 = -1$.

A. $-7 + 5i$

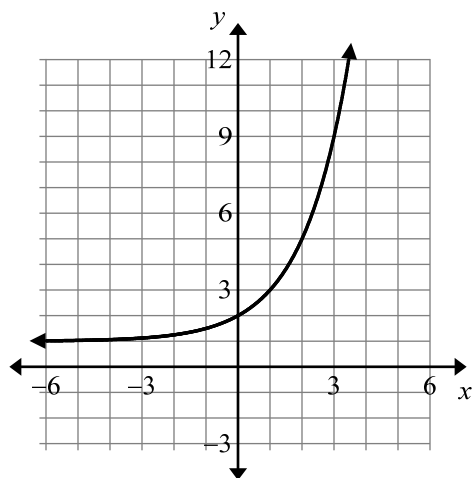
B. $-7 - i$

C. $-5 + 5i$

D. $5 - 5i$

Applied Algebra II Semester 2 Practice Exam A

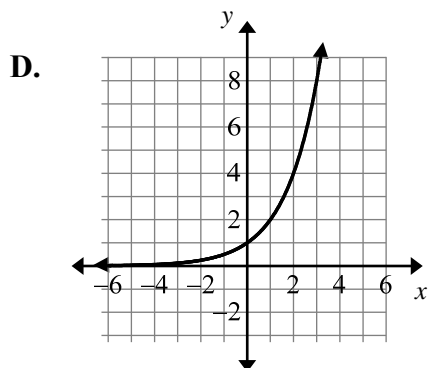
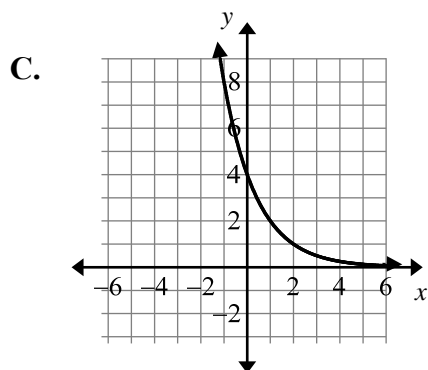
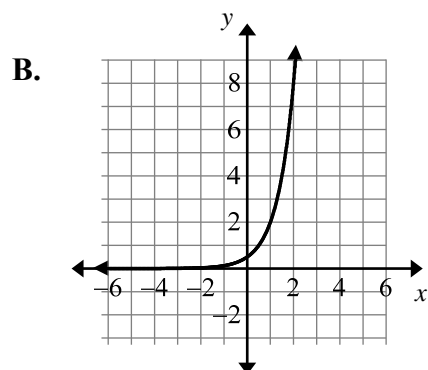
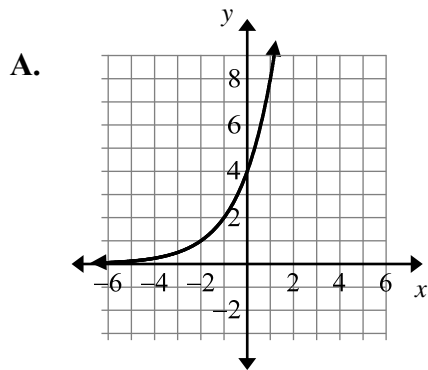
12. What function is represented by the graph?



- A. $y = 1 + 2^x$
- B. $y = 1 + 2x$
- C. $y = 1 + 2x^2$
- D. $y = 1 + 2x^3$

13. Which graph represents

$$f(x) = 4\left(\frac{1}{2}\right)^x ?$$



Applied Algebra II Semester 2 Practice Exam A

14. Solve for x : $5^{3x+2} = 5^{14}$

A. $x = \frac{4}{15}$

B. $x = \frac{16}{3}$

C. $x = 4$

D. $x = 7$

15. Solve for x : $2^{x+1} = 8^{x-2}$

A. $x = \frac{3}{2}$

B. $x = \frac{7}{2}$

C. $x = 2$

D. no solution

16. What is the solution to the given system of linear equations?

$$2x - 3y + z = 10$$

$$y + 2z = 13$$

$$z = 5$$

A. $(7, 3, 5)$

B. $(8, 5, 5)$

C. $\left(\frac{17}{2}, 4, 5\right)$

D. $\left(\frac{39}{2}, 8, 5\right)$

17. The value of w varies directly with x and inversely with y . If $w = 5$ when $x = \frac{3}{4}$

and $y = \frac{1}{2}$, what is the value of w when

$x = 4$ and $y = \frac{1}{3}$?

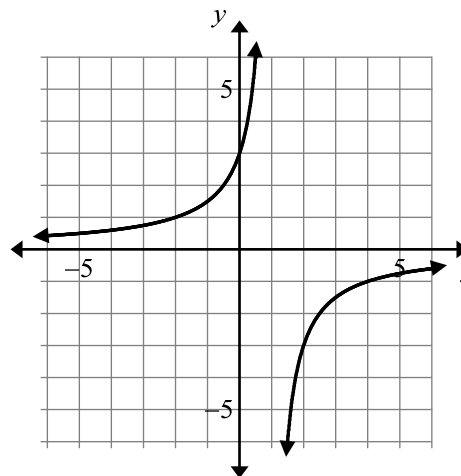
A. 40

B. 90

C. 160

D. $\frac{160}{9}$

18. What function is represented by the graph?



A. $f(x) = -\frac{3}{x}$

B. $f(x) = -\frac{3}{x+1}$

C. $f(x) = -\frac{3}{x-1}$

D. $f(x) = 3 - \frac{3}{x}$

Applied Algebra II Semester 2 Practice Exam A

19. What is the domain of the function

$$f(x) = \frac{2x}{x^2 - 3x - 4} ?$$

- A. $x \in \square$
- B. $x \in \square$, except 0
- C. $x \in \square$, except -1 and 4
- D. $x \in \square$, except 0, -1, and 4

20. Which of the following functions have an asymptote at $y = 1$?

I. $y = \frac{1}{x-1}$

II. $y = \frac{x}{x-1}$

III. $y = \frac{1}{x}$

- A. II only
- B. I and II only
- C. I and III only
- D. I, II, and III

21. If no denominators equal zero, which expression is equal to $\frac{3}{4} + \frac{5}{3x} - \frac{4}{2x^2}$?

- A. $\frac{4}{12x^2}$
- B. $\frac{29x^3 - 24}{12x^2}$
- C. $\frac{3x^2 + 4x - 6}{12x^2}$
- D. $\frac{9x^2 + 20x - 24}{12x^2}$

22. Simplify the expression $\frac{x^2 + 2x - 15}{\frac{15}{x^2 - 9} \cdot \frac{30}{30}}$.

- A. $\frac{x-15}{-9}$
- B. $\frac{2(x+5)}{x+3}$
- C. $\frac{x-9}{15}$
- D. $\frac{2(x-3)}{15}$

23. What is the solution set of

$$\frac{3}{x} + \frac{5}{x+2} = 2 ?$$

- A. $\{-1, 3\}$
- B. $\{0, 4\}$
- C. $\left\{-\frac{1}{2}\right\}$
- D. $\{-1\}$

24. What is the solution set of

$$\frac{x+5}{x-2} - \frac{5}{x+2} = \frac{28}{x^2-4} ?$$

- A. $\{-8, 2\}$
- B. $\{-8\}$
- C. $\{-4, 2\}$
- D. $\{-4\}$

Applied Algebra II Semester 2 Practice Exam A

25. What is the minimum or maximum of the quadratic function $q(x) = 8 - x + x^2$?

A. $q(x) = \frac{35}{4}$

B. $q(x) = \frac{31}{4}$

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

D. $q(x) = 8$

26. A circle has the equation $x^2 + y^2 = 23$.

If the circle were translated 2 units right and 4 units down, what is its new equation?

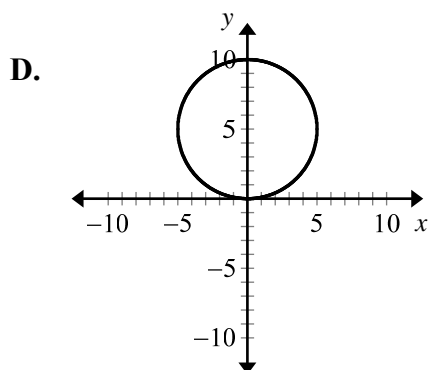
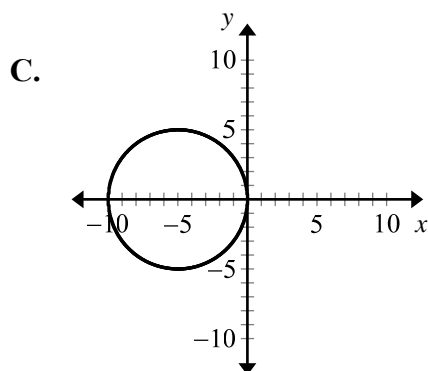
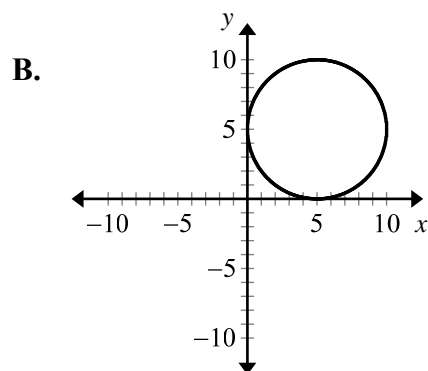
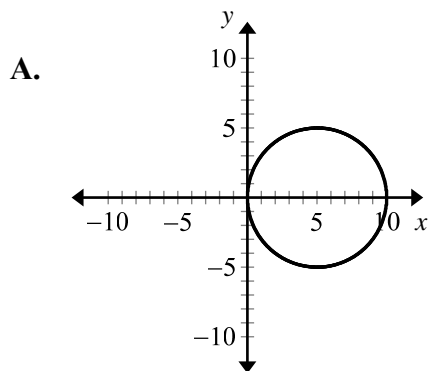
A. $x^2 + y^2 = 21$

B. $x^2 + y^2 = 25$

C. $(x+2)^2 + (y-4)^2 = 23$

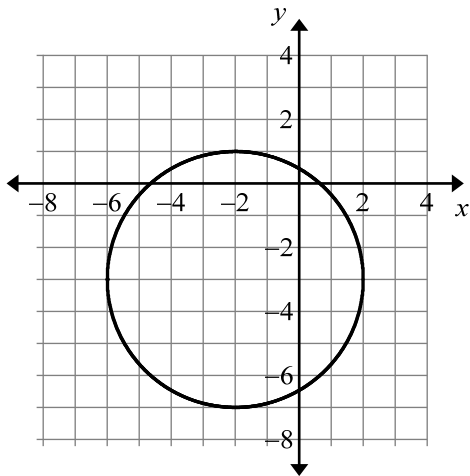
D. $(x-2)^2 + (y+4)^2 = 23$

27. What graph represents the equation $(x-5)^2 + y^2 = 25$?



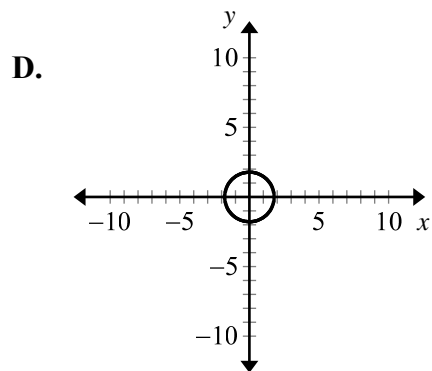
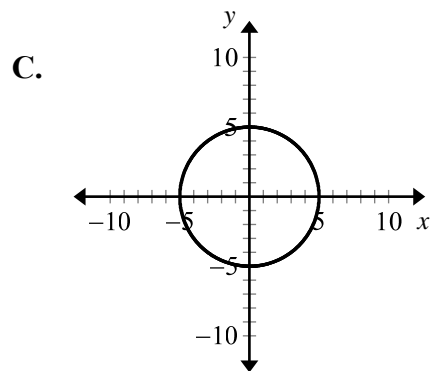
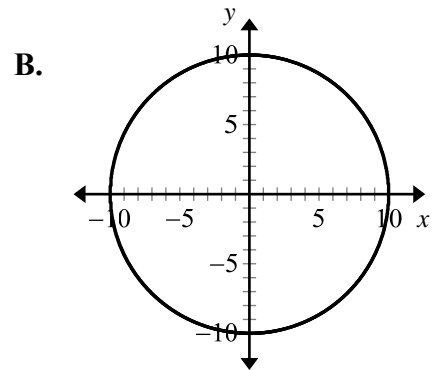
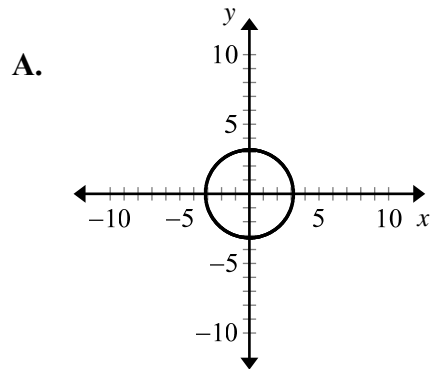
Applied Algebra II Semester 2 Practice Exam A

28. Which equation is represented by the graph below?



- A. $(x+2)^2 + (y+3)^2 = 4$
- B. $(x-2)^2 + (y-3)^2 = 4$
- C. $(x+2)^2 + (y+3)^2 = 16$
- D. $(x-2)^2 + (y-3)^2 = 16$

29. What graph represents the equation $x^2 + y^2 - 10 = 0$?



Applied Algebra II Semester 2 Practice Exam A

30. Find the center and radius of the circle that has the equation in standard form:

$$x^2 + y^2 - 6x + 4y - 12 = 0$$

- A. center at $(-2, -3)$; radius = 25
- B. center at $(-2, 3)$; radius = 5
- C. center at $(2, 3)$; radius = 25
- D. center at $(3, -2)$; radius = 5

31. Given the system of linear equations:

$$2x + 3y = 5$$

$$-x + 4y = 6$$

Which expression below shows the solution to the system using matrices?

- A. $\begin{bmatrix} x \\ y \end{bmatrix} = \frac{1}{11} \begin{bmatrix} 4 & -3 \\ 1 & 2 \end{bmatrix} \begin{bmatrix} 5 \\ 6 \end{bmatrix}$
- B. $\begin{bmatrix} x \\ y \end{bmatrix} = \frac{1}{5} \begin{bmatrix} 2 & 3 \\ -1 & 4 \end{bmatrix} \begin{bmatrix} 5 \\ 6 \end{bmatrix}$
- C. $\begin{bmatrix} x \\ y \end{bmatrix} = \frac{1}{11} \begin{bmatrix} -2 & -1 \\ 3 & -4 \end{bmatrix} \begin{bmatrix} 5 \\ 6 \end{bmatrix}$
- D. $\begin{bmatrix} x \\ y \end{bmatrix} = \frac{1}{5} \begin{bmatrix} -4 & 3 \\ -1 & -2 \end{bmatrix} \begin{bmatrix} 5 \\ 6 \end{bmatrix}$

32. How many terms are in the arithmetic sequence $-3, 2, 7, 12, \dots, 192$?

- A. 40
- B. 35
- C. 18
- D. 10

33. Expand the expression $\sum_{n=1}^6 -n^2 + 5$.

- A. $-1 - 4 - 9 - 16 - 25 - 36 + 5$
- B. $4 + 1 - 4 - 11 - 20 - 31$
- C. $4 + 3 + 2 + 1 + 0 - 1$
- D. $6 + 9 + 14 + 21 + 30 + 41$

34. What sequence is geometric?

- A. $\{-3, -6, -18, -72, -360, \dots\}$
- B. $\{-4, -1, -6, -11, -16, \dots\}$
- C. $\left\{3, 1, \frac{1}{3}, \frac{1}{9}, \frac{1}{27}, \dots\right\}$
- D. $\left\{2, 1, \frac{1}{3}, \frac{1}{12}, \frac{1}{60}, \dots\right\}$

35. What is the series $\frac{4}{7} + \frac{5}{8} + \frac{6}{9} + \frac{7}{10} + \dots$ when written in summation notation?

- A. $\sum_{i=4}^{\infty} \frac{i}{i+3}$
- B. $\sum_{i=4}^{\infty} \frac{i+3}{i+6}$
- C. $\sum_{i=4}^{\infty} \frac{4i}{4i-1}$
- D. $\sum_{i=4}^{\infty} \frac{2i-1}{3i-2}$

Applied Algebra II Semester 2 Practice Exam A

36. What is the 16th term of the arithmetic sequence $-7, -1, 5, 11, \dots$?

- A. 27
- B. 59
- C. 83
- D. 89

37. Which is a formula of a geometric sequence when $g_1 = 3$ and $g_6 = -96$?

- A. $g_n = -3(1 - (-2)^n)$
- B. $g_n = \frac{3}{1 - (-2)^{n-1}}$
- C. $g_n = -3 \cdot 2^n$
- D. $g_n = 3 \cdot (-2)^{n-1}$

38. The first row in a school theatre has 25 seats. Each following row has one more seat than the row before it. A class of thirty-five students wants to sit in the same row. What is the lowest numbered row in which they can sit?

- A. 10th row
- B. 11th row
- C. 12th row
- D. 13th row

39. Which is a recursive rule for the sequence 2, 4, 7, 11, 16, ...?

- A. $t_1 = 2, t_n = 2t_{n-1}$
- B. $t_1 = 2, t_n = t_{n-1} + 2$
- C. $t_1 = 2, t_n = t_{n-1} + n$
- D. $t_1 = 2, t_n = 3t_{n-1} - n$

40. Which sequence represents the following definition:

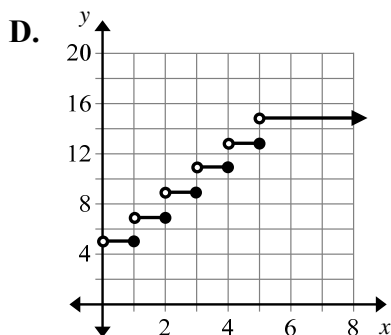
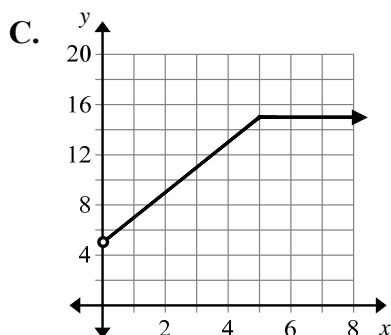
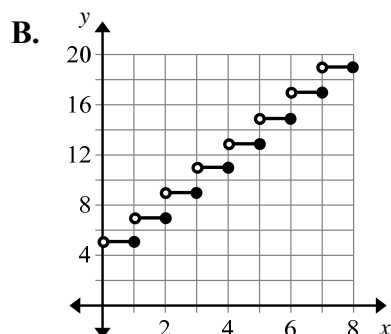
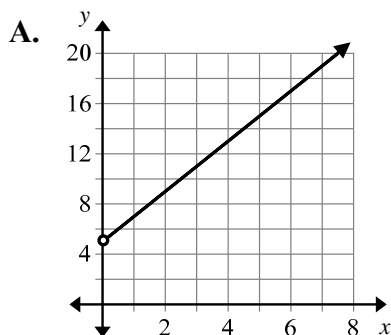
$$t_1 = 2$$

$$t_n = t_{n-1} + 2n$$

- A. $\{2, 4, 6, 8, 10, 12, \dots\}$
- B. $\{2, 4, 8, 14, 22, 32, \dots\}$
- C. $\{2, 6, 8, 10, 12, 14, \dots\}$
- D. $\{2, 6, 12, 20, 30, 42, \dots\}$

Applied Algebra II Semester 2 Practice Exam A

41. The charge for parking at an airport is \$5 for time up to one hour, plus \$2 for each additional hour (or portion of an hour) up to a maximum of \$15. What graph represents this situation?



42. In the 1980's, the standard configuration for a Wyoming license plate was a small number between 1 and 23, inclusive, followed by four digits with repetition allowed.

For example:



How many license plates were possible for the entire state of Wyoming in the 1980's?

- A. 116,000
 B. 230,000
 C. 300,000
 D. 1,000,000
43. A student will randomly choose four digits from the set $\{1, 2, 3, 4, 5, 6\}$, without replacement, and arrange them in the order they were chosen. How many different four-digit numbers can be made in this way?
- A. 15
 B. 24
 C. 360
 D. 720

Applied Algebra II Semester 2 Practice Exam A

44. There are 10 students in a class. Four of them are to be selected at random to participate in an activity. How many different groups of 4 students are possible?
- A. 40
B. 210
C. 1,040
D. 10,000
45. What is the binomial expansion of $(x + 2)^4$?
- A. $4x + 8$
B. $x^2 + 4x + 4$
C. $x^4 + 8x^3 + 24x^2 + 32x + 16$
D. $2x^4 + 2x^3 + 4x^2 + 8x + 16$
46. What is the 3rd term of the binomial expansion of $(2x + 4)^3$?
- A. $128x$
B. $96x$
C. $48x^2$
D. $384x^2$
47. Linda flipped a fair coin six times and the result was heads each time. Which statement describes the probability of obtaining heads on the seventh flip?
- A. Heads is more probable than tails because she has flipped only heads.
B. Heads is not probable at all because only heads has come up.
C. Heads is less probable than tails because each result depends on the previous result.
D. Heads is equally as probable as tails because each flip is independent.
48. A cooler contains 8 cans of cola, 6 cans of ginger ale, 4 cans of root beer, and 2 cans of orange soda. If a person reaches in the cooler and pulls out two cans at random, what is the probability that both cans will be ginger ale?
- A. $\frac{1}{10}$
B. $\frac{1}{30}$
C. $\frac{3}{38}$
D. $\frac{3}{40}$

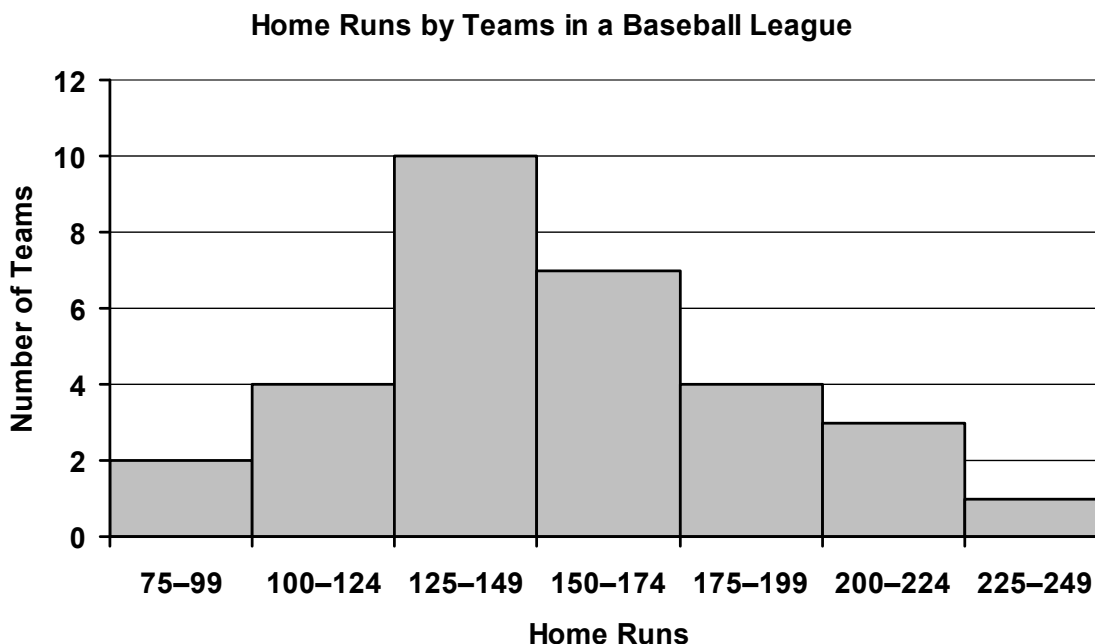
Applied Algebra II Semester 2 Practice Exam A

49. Which of these measures are greatly influenced by extreme values?

- I. mean
- II. median
- III. interquartile range
- IV. range

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

50. The graph below shows the number of home runs hit by the 31 teams in a baseball league.



Which value could be the median number of home runs?

- A. 177
- B. 162
- C. 147
- D. 112



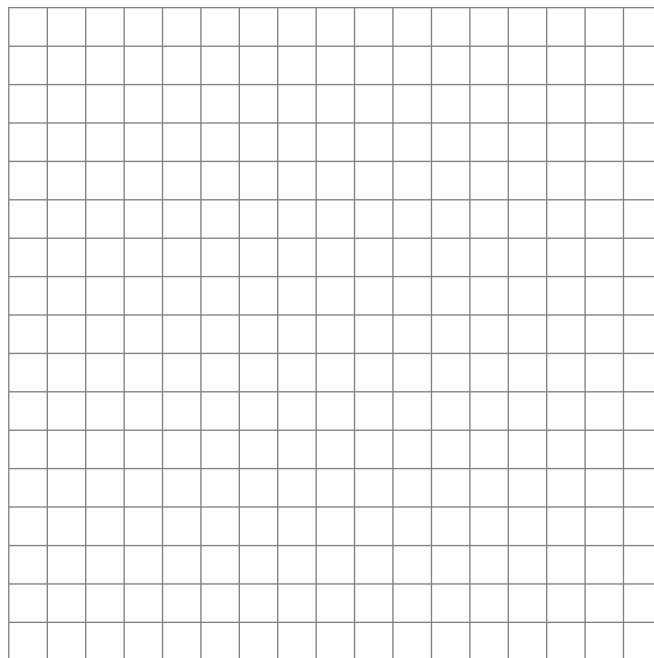
Applied Algebra II Semester 2 Practice Exam A Free Response

1. Use the functions $p(x) = x^3 - 8$ and $q(x) = \sqrt[3]{x+8}$ to answer the questions below.

A. What are the domain and range of $p(x)$?

B. Sketch the graph of $y = q(x)$ on the grid provided.

C. Are $p(x)$ and $q(x)$ inverse functions of each other? Provide evidence why or why not.



D. Let $r(x) = 2x - 1$. Find $p(r(x))$.

2. The equation of a circle is $(x - 2)^2 + (y + 3)^2 = 4$.

A. Tell whether each of the following points is inside, outside, or on the circle. Justify your answers.

I. $(2, -4)$

II. $(0, -3)$

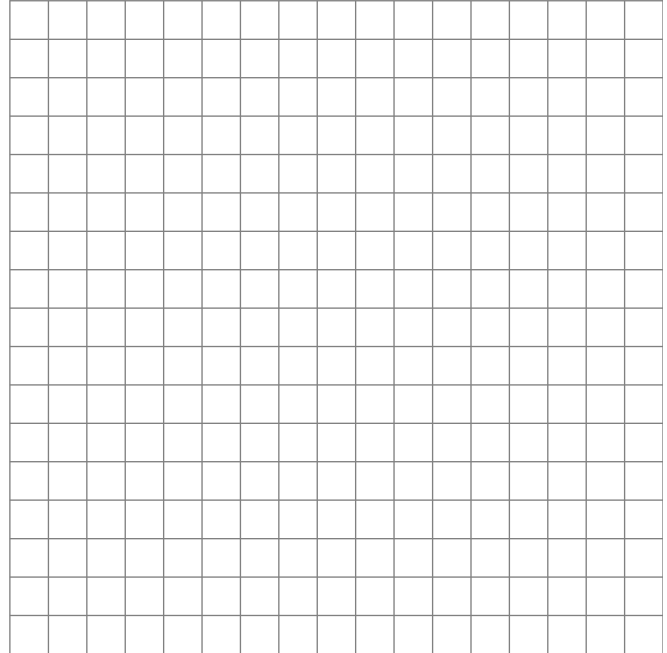
III. $(3, -1)$

B. Tell whether $P(a, a)$ is inside, outside, or on the circle defined by the equation $x^2 - 2ax + y^2 + 2ay = 4a^2$, where $a \neq 0$. Justify your answer.

Applied Algebra II Semester 2 Practice Exam A Free Response

3. Use the function $f(x) = \frac{x^2 - 3x + 2}{2x}$ to answer part A below.

A. Sketch the graph of $y = f(x)$ on the grid provided. Be certain to note any asymptotes and intercepts on the graph.



B. Solve $\frac{15}{x} + \frac{9x-7}{x+2} = 9$.

