

# Algebra II - Comprehensive Review Packet

Work together. Use pencil only. Problems included represent chapters 3 and 5 through 14. Turn this packet in to the homework box when you submit your final exam. These problems will be extraordinarily helpful to you in your studies, so take them seriously!

## Algebra II Review Packet

### Solve the linear system.

1.  $4x + 5y = 6$   
 $3x - 5y = 22$

2.  $4x - 3y = -1$   
 $3x + 4y = -3$

### Solve the system of equations.

3.  $2x + 3y - z = 1$   
 $x + y + z = 3$   
 $3x - y + z = 15$

4. Solve by factoring:  $x^2 - 18x + 81 = 0$

5. Solve the equation  $(x + \sqrt{2})(x - \sqrt{2}) = 7$ .

### Write the expression as a complex number in standard form.

6.  $(-2 + 4i) - (3 + 9i)$

7.  $(2i)(1 - 4i)(1 + i)$

8. Write the expression  $(1 - i)(1 + i)$  as a complex number in standard form.

9. Solve the equation.  $x^2 - x + 2 = 0$

10. Solve the equation by completing the square.  
 $x^2 + 2x - 24 = 0$

### Simplify the expression.

11.  $\left(\frac{v^7}{w^6}\right)^5$

12. 
$$\frac{\frac{x^2 - 16x + 64}{-6x}}{\frac{x - 8}{-2x}}$$

### Find the sum or difference.

13.  $(-7x^2 + 3) + (4x^2 + 2x - 1)$

### Find the product.

14.  $(x + 1)(2x - 1)(x + 3)$

### Factor the polynomial completely.

15.  $n^5 + 216n^2$

16.  $5x^4 + 10x^2 - 15$

17.  $x^8 - 81$

Name: \_\_\_\_\_

**Divide using synthetic division.**

18.  $(2x^3 + 6x^2 - 16x + 24) \div (x + 5)$

19. Simplify  $\left(\frac{1}{100}\right)^{1/2}$ .

Simplify the expression. Write your answer using only positive exponents.

20.  $(x^{-2/5}y^{1/3})^{15}$

Simplify the expression.

21.  $2\sqrt[3]{128} + 3\sqrt[3]{1024}$

Let  $f(x) = (x - 3)^2$  and  $g(x) = -\frac{2}{x}$ . Perform the indicated operation and state the domain.

22.  $f(g(x))$

23.  $g(g(x))$

24. Let  $f(x) = -3x$ . Find  $f^{-1}$ .

25. Are the functions  $f$  and  $g$  below inverses of each other?

$$g(x) = \frac{1}{3}x - \frac{1}{2}, f(x) = \frac{3}{2}(2x + 1)$$

26. Sketch the graph of the function  $f(x) = 2 - 2x$  and its inverse on the same coordinate plane.



Find the inverse of the function.

27.  $f(x) = x^{10} + 5, x \leq 0$

Solve the equation. Check for extraneous solutions.

28.  $\ln(x + 7) = \ln(3x - 5)$

29.  $\log_2(-x) + \log_2(x + 12) = 5$

**Sketch the graph of the function. Include any vertical or horizontal asymptotes.**

30.  $y = \frac{1}{x} - 5$

31.  $f(x) = \frac{x - 2}{x + 2}$

**Solve the equation. Check for extraneous solutions.**

32.  $\frac{1}{j - 2} - \frac{2}{j - 4} = 0$

Name: \_\_\_\_\_

33. Find the distance between the points  $\left(2, -\frac{9}{5}\right)$  and  $\left(\frac{7}{5}, -1\right)$ .

34. Find the distance between point  $C(-2, 1)$  and point  $G(7, 4)$ , then find the midpoint of  $\overline{CG}$ .

35. Find an equation of the perpendicular bisector of the segment connecting the points  $(-1, 2)$  and  $(-6, -5)$ .

36. Write the standard form of the equation of the parabola with its vertex at  $(0, 0)$  and directrix  $x = 2$ .

39. How many different ways can you arrange five people shoulder-to-shoulder in a line?

40. How many different four-letter permutations are there for the letters in the word "toolroom?"

41.  $A$  and  $B$  are two events.  $P(A) = 0.54$ ;  $P(B) = 0.42$ ;  $P(A \text{ or } B) = 0.85$ . Find the probability of  $A$  and  $B$ .

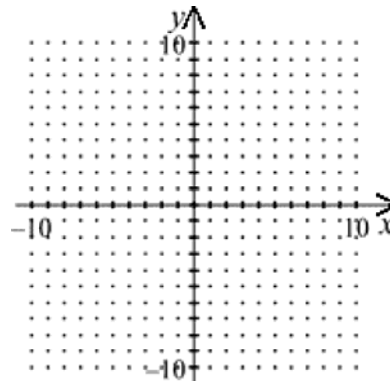
42. If  $P(A) = 0.72$ , what is  $P(\overline{A})$ ?

**A jar contains 21 green marbles and 30 yellow marbles. One marble is drawn at random and the color noted. It is then returned to the jar, mixed in, and another marble is drawn at random.**

43. Find the probability that both marbles are yellow.

Graph:

37.  $4x^2 + 16y^2 = 64$



38. Write the equation of the hyperbola with vertices at  $(0, -4)$  and  $(0, 4)$  and foci at  $(0, -9)$  and  $(0, 9)$ .

44. Find the probability that one marble of each color is obtained.

45. If a student tosses a penny, a nickel, a dime, and a quarter, what is the probability of returning a penny head, a nickel tail, a dime head, and a quarter head?

**Write the series with summation notation.**

46.  $2 + 5 + 8 + 11 + \dots$

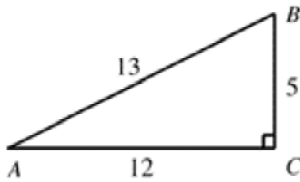
47. What is the first term of an arithmetic sequence with a common difference of 5 and a sixth term of 40?

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48. Identify the sequence as arithmetic, geometric, or neither.  
1, 4, 9, 16, 25, ...

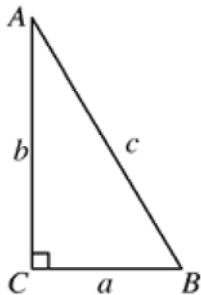
49. Find the common ratio of the geometric sequence.  
 $-\frac{1}{3}, 1, -3, 9, \dots$

50. Write  $\sin A$  as a fraction in lowest terms.



Use a calculator. Round to three decimal places.

51.  $\sec 12^\circ$
52.  $\csc 8^\circ$
53.  $\tan 42^\circ$
54. Solve  $\triangle ABC$  using the diagram and the given measurements. (The triangle is not drawn to scale.)  
 $B = 34^\circ, a = 19$



55. A ladder 20 feet long makes an angle of  $59^\circ$  with the ground as it leans against a house. How far up the side of the house does the ladder reach?

Find the *amplitude* and *period* of the graph.

56.  $y = 3 \sin 2\pi x$

57. Sketch one cycle of the graph of the function.

$$f(x) = 6 \sin \frac{x}{2}$$



58. Write an equation of the form  $y = a \sin bx$ , where  $a > 0$  and  $b > 0$ , with amplitude  $\frac{2}{3}$  and period 12.

Simplify the expression.

59.  $\cos\left(\frac{\pi}{2} - x\right) \sec x$

60.  $\frac{\sin^2(-x)}{\tan^2 x}$

Find the *exact* value of the expression.

61.  $\sin\left(\frac{\pi}{8}\right)$

62.  $\sin\left(\frac{7\pi}{8}\right)$

63. Solve  $\sin 2x \cos x = \sin x$  for  $0 < x < 2\pi$ .

## Algebra II Review Packet Answer Section

1. ANS:

$$(4, -2)$$

2. ANS:

$$\left(-\frac{13}{25}, -\frac{9}{25}\right)$$

3. ANS:

$$(4, -2, 1)$$

4. ANS:

$$9$$

5. ANS:

$$x = 3 \text{ or } x = -3$$

6. ANS:

$$-5 - 5i$$

7. ANS:

$$6 + 10i$$

8. ANS:

$$2$$

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9. ANS:

$$\frac{1}{2} \pm i \frac{\sqrt{7}}{2}$$

10. ANS:

$$-6, 4$$

11. ANS:

$$\frac{v^{35}}{w^{30}}$$

12. ANS:

$$\frac{x-8}{3}$$

13. ANS:

$$-3x^2 + 2x + 2$$

14. ANS:

$$2x^3 + 7x^2 + 2x - 3$$

15. ANS:

$$n^2(n+6)(n^2-6n+36)$$

16. ANS:

$$5(x^2+3)(x-1)(x+1)$$

17. ANS:

$$(x^4+9)(x^4-9)$$

18. ANS:

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

19. ANS:

$$\frac{1}{10}$$

20. ANS:

$$\frac{1}{x^{10}} \cdot y^5$$

21. ANS:

$$32\sqrt[3]{2}$$

22. ANS:

$$\left(3 + \frac{2}{x}\right)^2$$

domain:  $x \neq 0$ 

23. ANS:

$$x$$

domain:  $x \neq 0$ 

24. ANS:

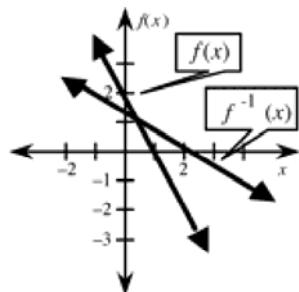
$$f^{-1}(x) = -\frac{1}{3}x$$

25. ANS:

They are.

26. ANS:

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



27. ANS:

$$f^{-1}(x) = -(\sqrt[10]{x-5})$$

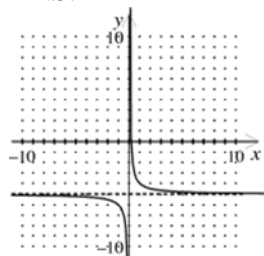
28. ANS:

$$x = 6$$

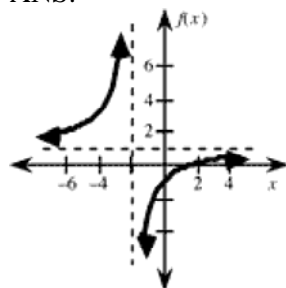
29. ANS:

$$x = 24 \text{ or } 28$$

30. ANS:



31. ANS:



32. ANS:

0

33. ANS:

1

34. ANS:

$$\text{midpoint} = \left( \frac{5}{2}, \frac{5}{2} \right)$$

$$\text{distance} = 3\sqrt{10}$$

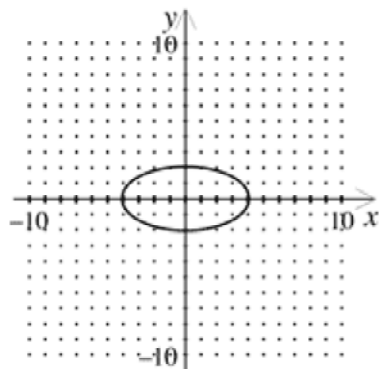
35. ANS:

$$y = -\frac{5}{7}x - 4$$

36. ANS:

$$y^2 = 8x$$

37. ANS:

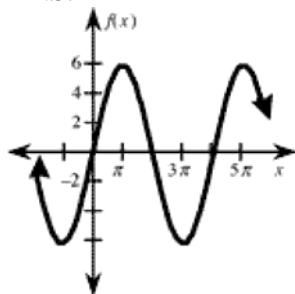


38. ANS:

$$\frac{y^2}{16} - \frac{x^2}{65} = 1$$

39. ANS:  
120
40. ANS:  
70
41. ANS:  
0.11
42. ANS:  
0.28
43. ANS:  
 $\frac{100}{289} \approx 0.35$
44. ANS:  
 $\frac{140}{289} \approx 0.48$
45. ANS:  
 $\frac{1}{16}$
46. ANS:  
 $\sum_{i=1}^{\infty} (3i - 1)$
47. ANS:  
15
48. ANS:  
Neither
49. ANS:  
-3
50. ANS:  
 $\frac{5}{13}$
51. ANS:  
1.022
52. ANS:  
7.185
53. ANS:  
0.900
54. ANS:  
 $A = 56^\circ, b = 12.82, c = 22.92$
55. ANS:  
17.14 ft
56. ANS:  
Amplitude: 3  
Period: 1

57. ANS:



58. ANS:

$$y = \frac{2}{3} \sin\left(\frac{\pi x}{6}\right)$$

59. ANS:

$$\tan x$$

60. ANS:

$$\cos^2 x$$

61. ANS:

$$\frac{\sqrt{2-\sqrt{2}}}{2} \quad (\text{There are other correct forms.})$$

62. ANS:

$$\frac{\sqrt{2-\sqrt{2}}}{2} \quad (\text{There are other correct forms.})$$

63. ANS:

$$0, \frac{\pi}{4}, \frac{3\pi}{4}, \pi, \frac{5\pi}{4}, \frac{7\pi}{4}$$