

# Woodland Community College: Math Practice Test

## Intermediate Algebra Math Test

The following problems are recommended practice problems for the intermediate algebra section of the placement test. Some of the problems may or may not be similar to the problems on the actual test. If you struggle to complete the problems, we suggest that you review those topics before taking the test.

1. Factor completely.

(a)  $15x^5 - 12x^4 + 27x^3 - 3x^2$  (b)  $16x^2 - 81y^2$  (c)  $-4x^2 + 23x - 28$  (d)  $4x^2 - 169$  (e)  $16x^2 + 25$   
(f)  $x^2 + 11x + 30$  (g)  $2x^2 + 9x - 18$  (h)  $125x^3 - 64$  (i)  $4x^2 - 4xy - 24y^2$

2. Solve the equations by factoring.

(a)  $4x^2 = 25$  (b)  $x(x+7) = -12$  (c)  $3x^3 - 2x^2 = 8x$  (d)  $3x^2 + 8x + 5 = 0$

3. Find the x- intercept of the given quadratic equation.

(a)  $y = 11x^2 + 21x - 2$  (b)  $y = 6x^2 - 2x - 28$

4. A diver jumps from a diving board that is 324 feet above the water. The height  $h$  (in feet) of the diver is modeled by the position equation  $h = -16t^2 + 324$ . Where  $t$  is time measured in seconds. How long will it take for the diver to reach the water?

5. The difference of two numbers is 5. The sum of their square is 125. Find the numbers.

6. The area of a square is 144 square units. Find the length of a side.

7. Find the two consecutive negative integers whose product is 240. Find the numbers.

8. Find the domain of each rational function.

(a)  $f(x) = \frac{x-3}{x^2-5x+6}$  (b)  $f(x) = \frac{x-1}{x^2-6x}$

9. Perform the indicated operation.

(a)  $\frac{x+3}{x^2+2x-8} \cdot \frac{x^2-2x}{x^2+6x+9}$  (b)  $\frac{x-2}{x^2+4x-4} \div \frac{2x+1}{x^2-4}$  (c)  $\frac{x-3}{x^2-2x-15} - \frac{4-x}{x^2-9x+20}$   
(d)  $\frac{x+1}{x^2-9} + \frac{x}{3-x}$  (e)  $\frac{x-3}{x+1} - \frac{x+2}{x}$

10. Simplify the complex fraction.

(a)  $\frac{3 - \frac{2}{x}}{\frac{4}{x^2} - 9}$  (b)  $\frac{\frac{3}{x-1} + \frac{4x}{x+1}}{\frac{7}{x-1} - \frac{2}{x+1}}$  (c)  $\frac{\frac{3}{x} + \frac{1}{y}}{\frac{9}{x^2} - \frac{1}{y^2}}$  (d)  $\frac{5x^{-1} - 2y^{-1}}{25x^{-2} - 4y^{-2}}$

11. Solve the following equations.

(a)  $\frac{x}{x-1} = \frac{1}{2} + \frac{3}{x}$  (b)  $\frac{3}{x+1} - \frac{1}{x+1} = \frac{14}{x^2-1}$  (c)  $\frac{x}{x^2-9} + \frac{4}{4x-12} = \frac{-3}{x}$

12. Solve the equation  $T = \frac{5R}{S+U}$  for S.

13. Solve the equation  $\frac{1}{x} = \frac{1}{y} + \frac{1}{z}$  for  $x$ .

14. Renee walks 4 mi in the same time that Jane jogs 7.2 mi. If Jane jogs 2mph faster than Renee walks, then how fast does Jane jog?

15. The quotient of twice a number and three, minus one-sixth is the quotient of the number and two. What is the number?

16. Smith Engineering is in the process of reviewing the salaries of their surveyors. During this review the company found that an experienced surveyor can survey a roadbed in 6 hours. An apprentice surveyor needs 9 hours to survey the same stretch of road. If the two work together, find how long it takes them to complete the job.

17. A paddle boat can move at a speed of 4km/h in still water. The boat is paddled 14 km downstream in a river in the same time it takes to go 7 km upstream. What is the speed of the river?

18. Solve the equations.

(a)  $x^2 + 6x = -3$  (b)  $(x - 7)^2 = 36$  (c)  $(x - 2)^2 - 16(x - 2) + 63 = 0$  (d)  $x^{2/3} - 3x^{1/3} - 10 = 0$   
 (e)  $x^{-2} - 5x^{-1} + 6 = 0$

19. Solve the equation by completing the square. (a)  $x^2 - 12x + 19 = 0$  (b)  $4x^2 - 24x + 15 = 0$

20. Solve the quadratic inequality. Graph the solution and write the solution in

21. interval notation.

(a)  $3x^2 + 16x < -5$  (b)  $\frac{x^2 + 6}{5x} \geq 1$  (c)  $\frac{x - 2}{x + 6} \geq 0$  (d)  $x^2 + 2x - 8 \leq 0$

22. Graph parabola. Find the vertex and label the axis of symmetry.

(a)  $f(x) = 4(x - 2)^2 + 1$  (b)  $f(x) = -2x^2 + 3$  (c)  $f(x) = x^2 - 4x + 3$

23. A triangle has a height of  $x - 8$  and the base of  $2x - 8$ . Given that the area of the triangle is 32square feet. Find the base and the height of the triangle.

24. If a projectile is fired straight upwards from the ground with the initial speed of 160 feet per second, then its height  $h$  in feet after  $t$  seconds is given by the equation  $h(t) = -16t^2 + 160t$ . Find the maximum height of the projectile.

25. A jogger ran 3 miles, decreased her speed by 1 mile per hour, and then ran another 4 miles. If her total time was 1.6 hours, find her speed for each part of her run.

26. Use  $A = P(1 + r)^t$  to find the rate  $r$  at which \$ 250,000 grows to \$330,625 in 2 years.

27. One number is 8 more than another number, if the product of these numbers is 273. What are the two numbers?

28. Simplify each of the following. Assume all variables represent positive real number.

(a)  $7\sqrt[5]{64x^{13}y^{17}}$  (b)  $\frac{\sqrt{21x^3y^7}}{\sqrt{3x}y}$  (c)  $\frac{\sqrt[5]{64x^{10}y^3}}{\sqrt[5]{2x^3y^{-7}}}$  (d)  $\left(\frac{3a^{-1}b^{-2}}{b^3}\right)^3$   
 (e)  $4\sqrt[4]{192x^8y^{30}z^{25}}$  (f)  $(-8)^{-4/3}$  (g)  $\frac{3\sqrt[3]{100x^{28}}}{2\sqrt{2x^{-1}}}$  (h)  $\frac{\sqrt[4]{96x^{10}y^3}}{\sqrt[4]{3x^2y^3}}$

29. Perform the indicated operation.

$$\begin{array}{lll}
 \text{(a)} \sqrt{10xy^3} \cdot \sqrt{5x^3y} & \text{(b)} (2\sqrt{6} - \sqrt{7})(4\sqrt{6} + 3\sqrt{7}) & \text{(c)} \sqrt{3}(2\sqrt{6} - 5\sqrt{12}) \\
 \text{(d)} 3\sqrt{108} - 2\sqrt{18} - 3\sqrt{48} & \text{(e)} \sqrt[3]{54xy^3} - 5\sqrt[3]{2xy^3} + y\sqrt[3]{128x} & \text{(f)} \sqrt[3]{48xy^3} - 5\sqrt[3]{384xy^3} + y\sqrt[3]{6x} \\
 \text{(g)} \frac{-\sqrt[3]{2x^4}}{9} + \sqrt[3]{\frac{250x^4}{27}} & \text{(h)} \sqrt[4]{50x^2y^3} \cdot \sqrt[4]{25x^3y^2} & 
 \end{array}$$

30. Rationalize the denominator in each expression. Assume all variables represent positive real numbers.

$$\text{(a)} \frac{5x}{\sqrt[5]{8x^9y^{11}}} \quad \text{(b)} \frac{3}{\sqrt[3]{2}} \quad \text{(c)} \frac{2}{1 + \sqrt{15}} \quad \text{(d)} \frac{6}{\sqrt{5} - \sqrt{3}} \quad \text{(e)} \frac{\sqrt{5}}{\sqrt{5} + \sqrt{3}}$$

31. Use rational expression to write as a single radical expression.  $\sqrt[4]{3} \cdot \sqrt[3]{5}$

32. Solve the following equations. (check your answers).

$$\text{(a)} \sqrt{2x-3} + x = 3 \quad \text{(b)} \sqrt{x-3} + \sqrt{x+2} = 5 \quad \text{(c)} \sqrt{x+3} = \sqrt{x} - 3$$

33. Find the distance between  $(-9, 5\sqrt{3})$  and  $(-13, 3\sqrt{3})$ .

34. Perform the indicated operations write the answer in the form  $a + bi$

$$\text{(a)} (3 + 2i) - (6 + i) + (5 + 3i) \quad \text{(b)} \frac{7}{4 + 3i} \quad \text{(c)} \frac{3 + 4i}{2i} \quad \text{(d)} (3 - 4i)^2$$

35. Simplify (a)  $i^{75}$  (b)  $i^{-18}$  (c)  $i^{79}$  (d)  $\sqrt{-75}$

36. If  $f(x) = x^2 - 6x + 2$  and  $g(x) = -2x$  find  $(g \circ f)(2)$ .

37. Find the inverses of the following functions.

$$\text{(a)} f(x) = \frac{1}{2}x - 7 \quad \text{(b)} f(x) = \frac{1}{3x - 8}$$

38. Graph (a)  $f(x) = 2^{x+2}$  (b)  $f(x) = 2^x + 1$  (c)  $f(x) = \left(\frac{1}{2}\right)^x$

39. Write  $\log_{0.4} 0.064 = 3$  as an exponential equation.

40. Write  $\pi^3 = x$  as a logarithmic equation.

41. Write as a single logarithm. (a)  $2\log_{10} x - 3\log_{10}(x+2) + \log_{10}(x^2 - 2)$  (b)  $5\log_5 x + 2\log_5 x - \frac{1}{4}\log_5 x$

$$\text{(c)} 2\log_4 2 + \log_4 10 - 2\log_4 5 \quad \text{(d)} \log_6 x - \log_6(x+5) + \log_6(x^2 + 2)$$

42. Solve each equation for x. (a)  $\log(3x-4) = -0.9$  (b)  $\ln(2x-1) = 3.4$  (c)  $2^{8x-2} = 7$

$$\text{(d)} e^{4x} = 3 \quad \text{(e)} \log_6 x + \log_6(x+16) = 2 \quad \text{(f)} \log_6(x+1) - \log_6 x = 2$$

$$\text{(g)} \ln 5 + \ln x = 0 \quad \text{(h)} \log_x 81 = 4 \quad \text{(i)} \log_{125} x = \frac{1}{3} \quad \text{(j)} \log_{27} 3 = x$$

43. Find how long it would take for \$1800 to double if it is invested at 6% interest compounded monthly.

Use  $A = P\left(1 + \frac{r}{n}\right)^{nt}$  and round to nearest tenth.

44. In 2007, Germany had a population of 82,800 thousand. At that time, Germany's population was declining at a rate of 0.035% per year. If this continues, how long will it take Germany's population to reach 82,000 thousand? Use  $y = y_0 e^{-0.00035t}$  and round to nearest tenth.
45. Find the elevation of a delta jet of the atmosphere pressure outside the jet is  $11.9 \text{ lb/in}^2$ . Use  $P = 14.7 e^{-0.21x}$  gives the average atmosphere pressure P in pounds per square inch, at an altitude x, in miles above the sea level. Round the answer to nearest tenth.
46. Graph parabola. Find the vertex.  $x = -y^2 - 4y - 6$
47. Find the center and radius of the circle and then graph.  $x^2 + y^2 + 2x + 4y - 11 = 0$
48. Graph the equation  $4x^2 - 25y^2 = 100$
49. Graph the equation  $4x^2 + 9y^2 = 36$
50. Graph the equation  $\frac{x^2}{8} + \frac{y^2}{8} = 2$
51. Graph the equation  $x = (y + 3)^2 - 1$
52. solve (a)  $\begin{cases} x^2 - 2y = 5 \\ x + y = -1 \end{cases}$  (b)  $\begin{cases} 5x^2 + 5y^2 = 60 \\ y = \sqrt{x} \end{cases}$  (c)  $\begin{cases} x^2 + y^2 = 1 \\ x + y = 4 \end{cases}$  (d)  $\begin{cases} x^2 + 3y^2 = 21 \\ x^2 - y^2 = 1 \end{cases}$

## Math practice Test answers

1. a.  $3x^2(5x^3 - 4x^2 + 9x - 10)$ , b.  $(4x - 9y)(4x + 9y)$  c.  $(4 - x)(4x - 7)$ , d.  $(2x - 13)(2x + 13)$ ,  
 e. prime, f.  $(x + 5)(x + 6)$ , g.  $(x + 6)(2x - 3)$ , h.  $(5x - 4)(25x^2 + 20x + 16)$ ,  
 i.  $4(x^2 - xy - 6y^2) = 4(x - 3y)(x + 2y)$
2. a.  $\pm \frac{5}{2}$ , b.  $-4, -3$ , c.  $\frac{-4}{3}, 0, 2$ , d.  $\frac{-5}{3}, -1$
3. a.  $-2, \frac{1}{11}$ , b.  $-2, \frac{7}{3}$
4. 4.5 sec
5. 5, 10
6. 12
7. -16, -15
8. a.  $\{x / x \in \mathbb{R} \text{ and } x \neq 2, 3\}$ , b.  $\{x / x \in \mathbb{R} \text{ and } x \neq 0, 6\}$

9. a.  $\frac{x}{(x+3)(x+4)}$ ,      b.  $\frac{(x-2)^2(x+2)}{(2x+1)(x^2+4x-4)}$ ,      c.  $\frac{2x}{(x-5)(x+3)}$ ,      d.  $\frac{-x^2-2x+1}{(x-3)(x+3)}$   
 e.  $\frac{-6x-2}{x(x+1)}$

10. a.  $\frac{-x}{3x+2}$ ,      b.  $\frac{(x+1)(4x+3)}{5x+9}$ ,      c.  $\frac{-xy}{x-3y}$ ,      d.  $\frac{xy}{2x+5y}$

11. a. 3, 2 ,      b. 8,      c.  $\frac{-3(\sqrt{61}+1)}{10}$ ,  $\frac{3(\sqrt{61}-1)}{10}$

12.  $S = \frac{5R - UT}{T}$

13.  $X = \frac{yz}{y+z}$

14. 4.5 mph

15. 1

16. 3.6

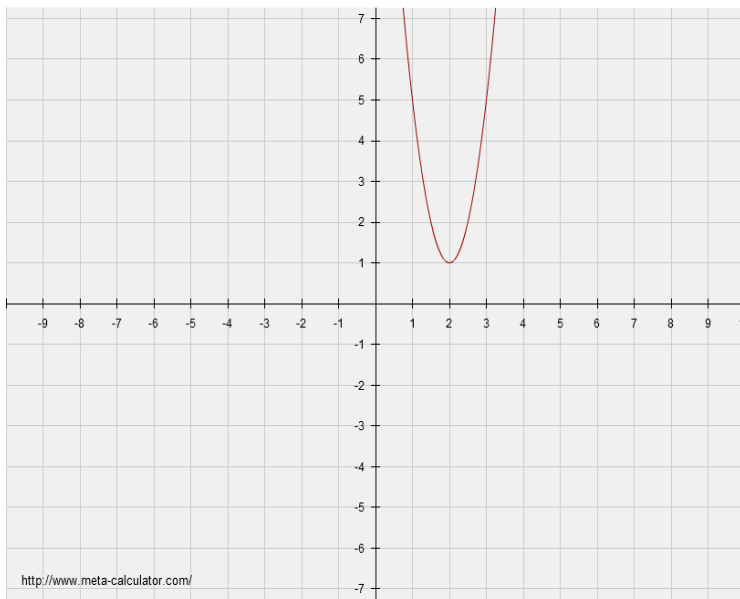
17. 12km/h

18. a.  $\pm\sqrt{6}-3$ ,      b. 1, 13,      c. 9, 11,      d. -8, 125,      e.  $\frac{1}{3}, \frac{1}{2}$

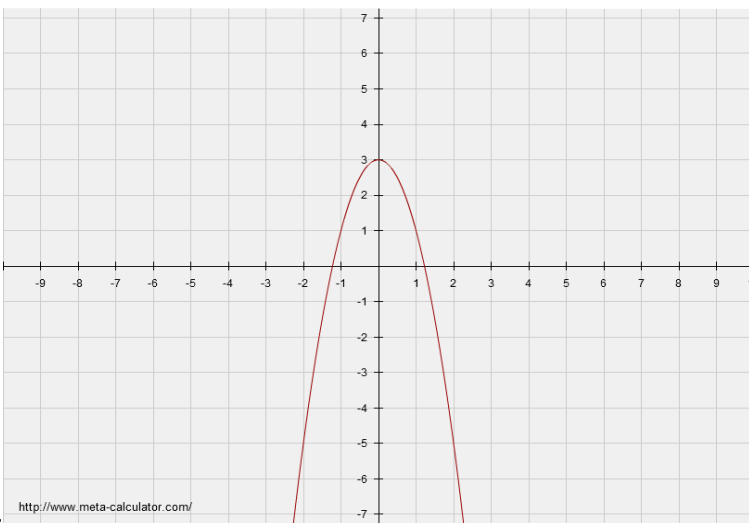
19. a.  $\pm\sqrt{17}+6$ ,      b.  $\frac{\pm\sqrt{21}+6}{2}$

20. a.  $(-5, -\frac{1}{3})$ ,      b.  $(0, 2) \cap [3, \infty)$ ,      c.  $(-\infty, 6) \cap ([2, \infty)$ ,      d.  $[-4, 2]$

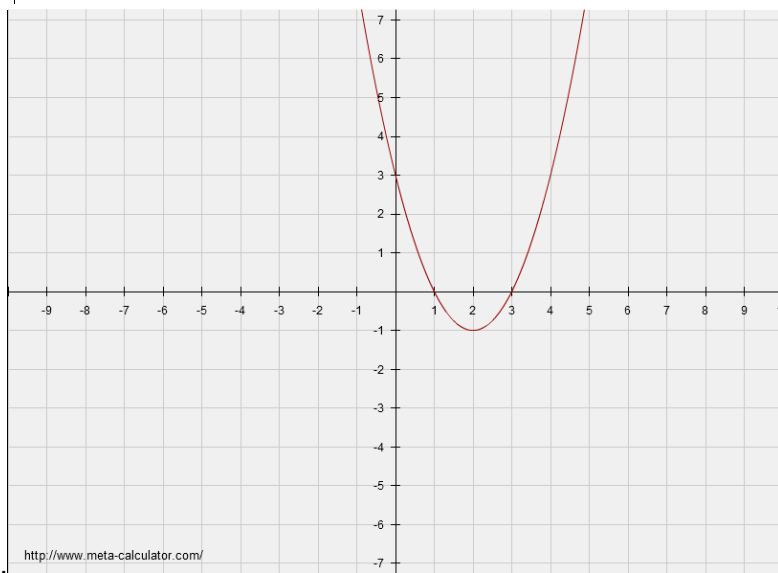
21. a



b.



c.



c.

22. 4,16

23. 400 feet

24. 4, 5

25. 3/20 or 15%

26. -21,-13 or 13,21

27. a.  $14x^2y^3\sqrt[5]{2x^3y^2}$ ,      b.  $|xy^3|\sqrt{7}$ ,      c.  $2xy^3\sqrt[5]{x^2}$ ,      d.  $\frac{27}{\sqrt{ab^{11}}}$ ,      e.  $2x^2y^7z^6\sqrt{12y^2z}$ ,

f.  $\frac{1}{16}$ ,      g.  $\frac{15x^{14}\sqrt{2x}}{2}$ ,      h.  $2x^4\sqrt[4]{2x}$

28. a.  $5x^2y^2\sqrt{2}$ ,      b.  $2\sqrt{42}+27$ ,      c.  $6\sqrt{2}-30$ ,      d.  $6\sqrt{3}-6\sqrt{2}$ ,      e.  $2y\sqrt[3]{2x}$ ,

f.  $-17y\sqrt[3]{6x}$ ,      g.  $\frac{4x\cdot\sqrt[3]{2x}}{9}$ ,      h.  $5xy\sqrt[4]{2xy}$

29. a.  $\frac{5\sqrt[5]{4xy^4}}{2xy^3}$ ,      b.  $\frac{3\sqrt[3]{4}}{2}$ ,      c.  $\frac{\sqrt{15}-1}{7}$ ,      d.  $3\sqrt{5}+3\sqrt{3}$

30.  $\sqrt[12]{16875}$

31. a. 2,      b. 7,      c. no solution

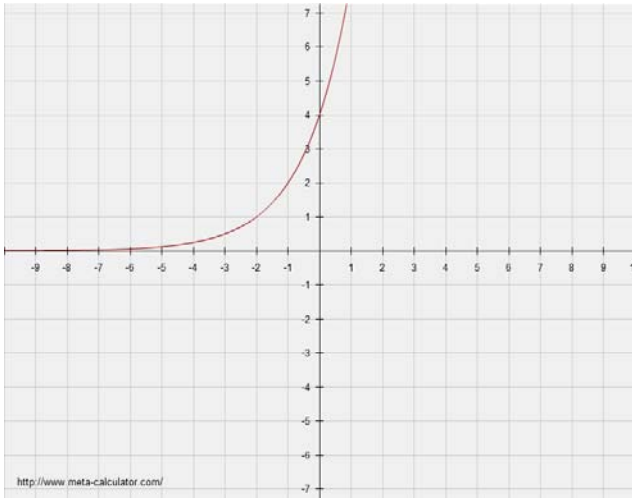
32.  $\sqrt{43}$

33. a.  $2+4i$ ,      b.  $\frac{28+21i}{25}$ ,      c.  $4-3i$ ,      d.  $-7-24i$

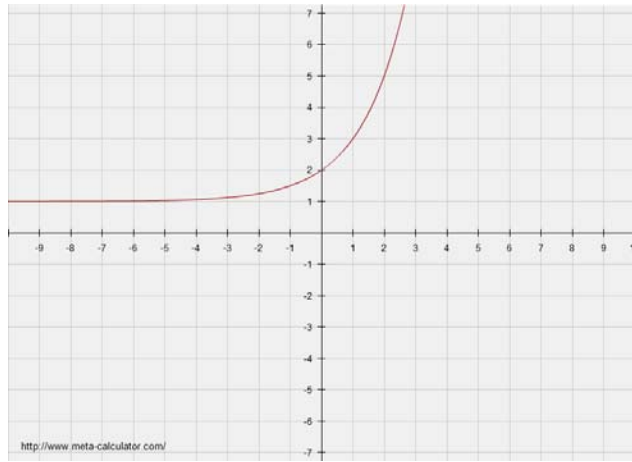
34. a.  $-i$ ,      b.  $-1$ ,      c.  $-i$ ,      d.  $5i\sqrt{3}$

35. 12

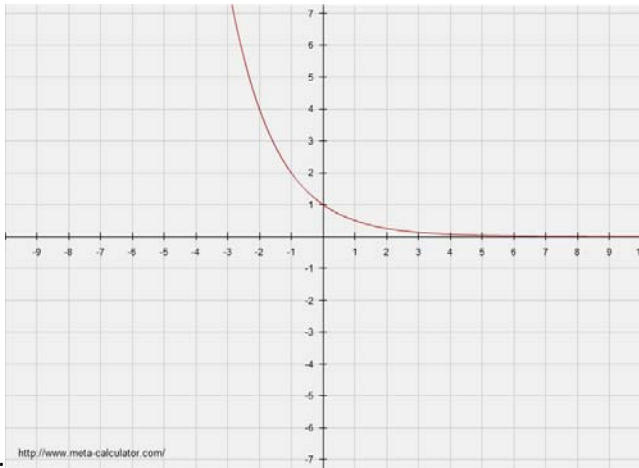
36. a.  $f(x)^{-1}=2x+14$ ,      b.  $f(x)^{-1}=\frac{8x+1}{3x}$



37. a.



b.



c.

38.  $0.4^3 = 0.00064$

39.  $\log_{\pi} X = 3$

40. a.  $\log_{10} \frac{x^2(x^2 - 2)}{(x + 2)^3},$

b.  $\log_5 x^6 \sqrt[4]{x^3},$

c.  $\log_4 \frac{8}{5},$

d.  $\log_6 \frac{x(x^2 - 2)}{x + 5}$



41. a.  $\frac{10^{10} + 40}{30}$ ,

b.  $\frac{e^{3.4} - 1}{2}$  or  $\approx 14.4821$ ,

c.  $\frac{\ln 28}{8 \ln 2}$  or  $\approx .60919$

d.  $\frac{\ln 3}{4}$  or  $\approx .274653$ ,

e. 2,

f.  $\frac{1}{35}$ ,

g.  $\frac{1}{5}$ ,

h. 3,

i. 5,

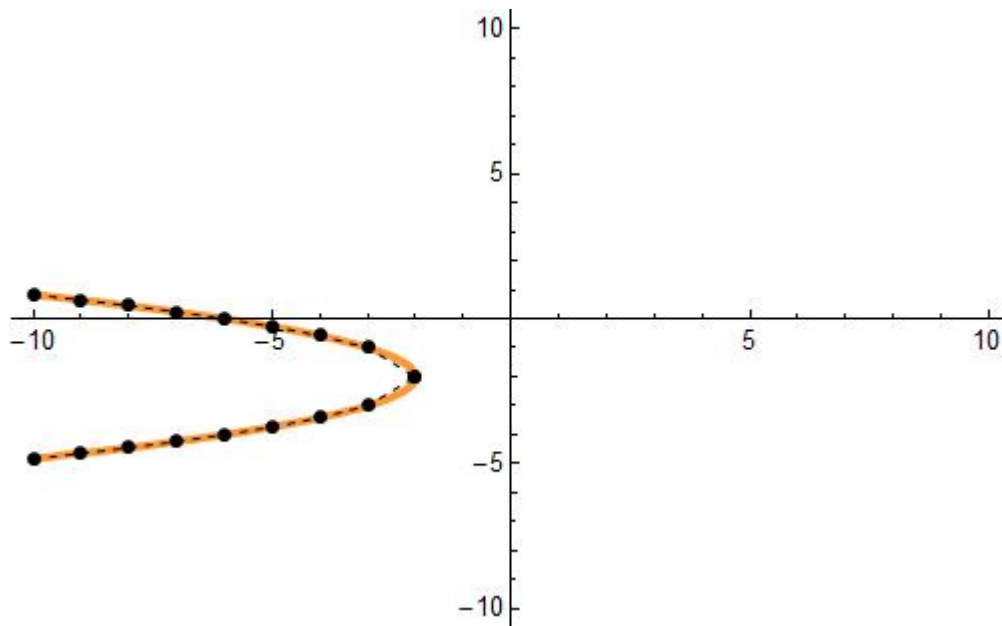
j.  $\frac{1}{3}$

42. 11.58

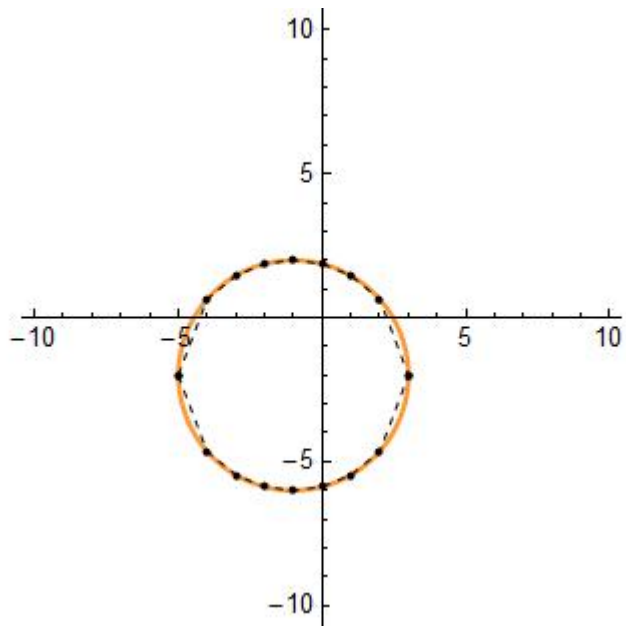
43. 27.7

44. 1.0

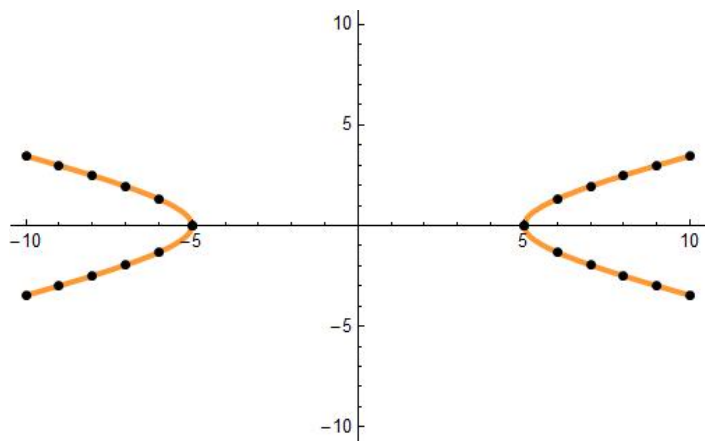
45. Vertex (-2,-2)



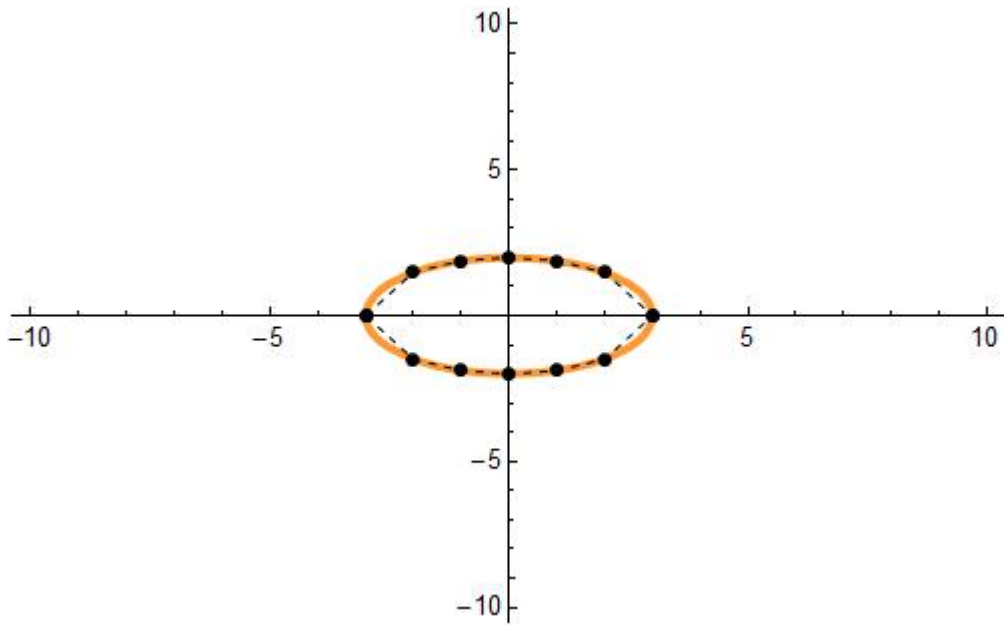
46.  $r=4$  C (-1,-2)



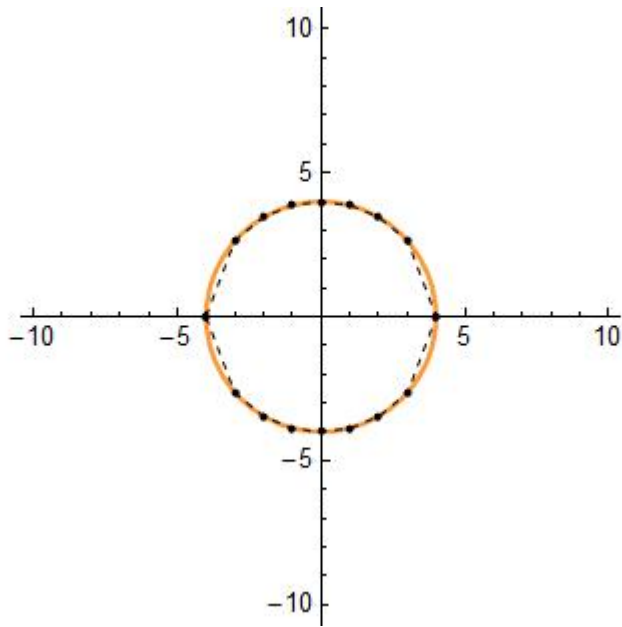
47.



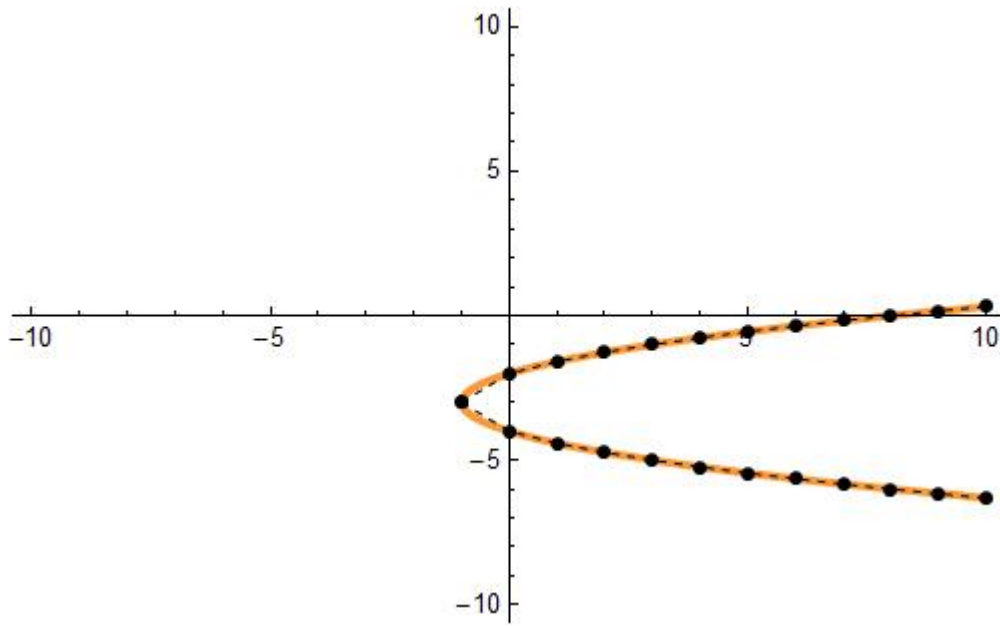
48.



49.



50.



51. a.  $(-3, 2)$  or  $(1, -2)$       b.  $(3, \sqrt{3})$ ,      c. no solution,  
 d.  $(-\sqrt{6}, -\sqrt{5})$  or  $(-\sqrt{6}, \sqrt{5})$  or  $(\sqrt{6}, -\sqrt{5})$  or  $(\sqrt{6}, \sqrt{5})$