

Honors Algebra 2A Mid-Season Classic Review

KEY

C

1. One side of a triangle is 5 centimeters longer than the shortest side. The third side of the triangle is twice as long as the shortest side. Find the length of the longest side of the triangle if its perimeter is 49 centimeters.

- A. 11 cm
- B. 16 cm
- C. 22 cm
- D. 18 cm

D

2. The graph of the line through (3,-2) that is perpendicular to the line with equation  $x = -1$  also goes through which point?

- A. (3, 2)
- B. (2, -3)
- C. (-2, 3)
- D. (-3, -2)

D

3. Write an equation in slope-intercept form for the line that passes through (-1, -2) and (3, -7).

- A.  $y = \frac{5}{4}x - \frac{3}{4}$
- B.  $y = -\frac{4}{5}x - \frac{6}{5}$
- C.  $y = \frac{4}{5}x - \frac{6}{5}$
- D.  $y = -\frac{5}{4}x - \frac{13}{4}$

A

4. Which number is NOT a solution to the equation  $|x+5| = x+5$ ?

- A. -10
- B. -5
- C. 0
- D. 5

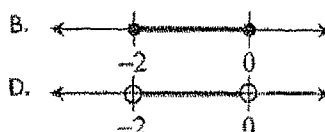
A

5. Which of the following best describes the translation to obtain the graph of  $y = -|x-1| - 3$  from the graph of  $y = |x|$ ?

- A. Reflect across the x-axis, shift right one unit and down three units.
- B. Reflect across the x-axis, shift left one unit and down three units.
- C. Reflect across the y-axis, shift left one unit and up three units.
- D. Reflect across the y-axis, shift right one unit and down three units.

C

6. Which of the following graphs represents the solution to  $2|x+1|+4 > 6$ ?



7. Solve:

a.  $|x+5|+2=9$

$x+5=7$

$x=2$

$x+5=-7$

$x=-12$

b.  $|x-15|+12=11$

$|x-15|=-1$

NO SOLUTION

Give the answer in interval notation:

c.  $\left| \frac{x+4}{3} \right| > 13$   $(-\infty, -43) \cup (35, \infty)$

$\frac{x+4}{3} > 13$

$x+4 > 39$

$x > 35$

$\frac{x+4}{3} < -13$

$x+4 < -39$

$x < -43$

e.  $2|4y-1|+6 > 20$

$2|4y-1| > 14$

$|4y-1| > 7$

$4y-1 > 7$

$4y > 8$

$y > 2$

$4y-1 < -7$

$4y < -6$

$y < -\frac{3}{2}$

$(-\infty, -\frac{3}{2}) \cup (2, \infty)$

d.  $\frac{x+1}{x-7} > \frac{x}{x+3}$

$\frac{x+1}{x-7} - \frac{x}{x+3} > 0$

$\frac{(x+1)(x+3) - x(x-7)}{(x-7)(x+3)} > 0$

$\frac{x^2+4x+3 - x^2+7x}{(x-7)(x+3)} > 0$

$\frac{11x+3}{(x-7)(x+3)} > 0$

$(-\frac{3}{11}, -3) \cup (7, \infty)$

8. Identify the y-intercept and the axis of symmetry for the graph of  $f(x) = 6x^2 + 36x - 17$ .

y-INTERCEPT:  $-17$

$x = -3$

$x = \frac{-36}{2(6)} = \frac{-36}{12} = -3$

9. Identify the vertex, axis of symmetry, and direction for opening for  $y = \frac{1}{2}(x-7)^2 - 3$ .

VERTEX:  $7, -3$

AXIS OF SYMM:  $x = 7$

OPENS UP

10. Write an equation for the parabola whose vertex is at  $(-8, 4)$  and passes through  $(-6, -2)$ .

$$y = a(x-h)^2 + k$$

$$-2 = a(-6+8)^2 + 4 \quad -\frac{3}{2} = a$$

$$-2 = a(4) + 4$$

$$-6 = 4a$$

$$y = -\frac{3}{2}(x+8)^2 + 4$$

11. Solve:

a.  $3x^2 = 8x + 28$

$$x = \frac{14}{3}, -2$$

b.  $2x^2 + 7x = 2(x-9)$

$$\frac{-5 \pm \sqrt{119}}{4}$$

12. Write an equation in VERTEX FORM to describe the graph of the parabola

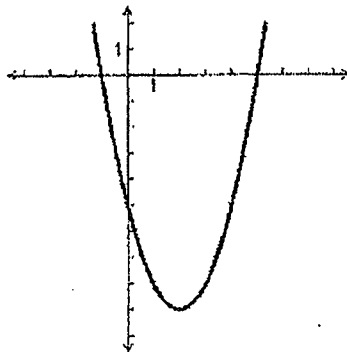
$$y = a(x-h)^2 + k$$

$$0 = a(5-2)^2 - 9$$

$$9 = 9a$$

$$1 = a$$

$$y = (x-2)^2 - 9$$



13. Graph the quadratic function. Label the vertex and axis of symmetry.

$$y = -x^2 - 2x + 2$$

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

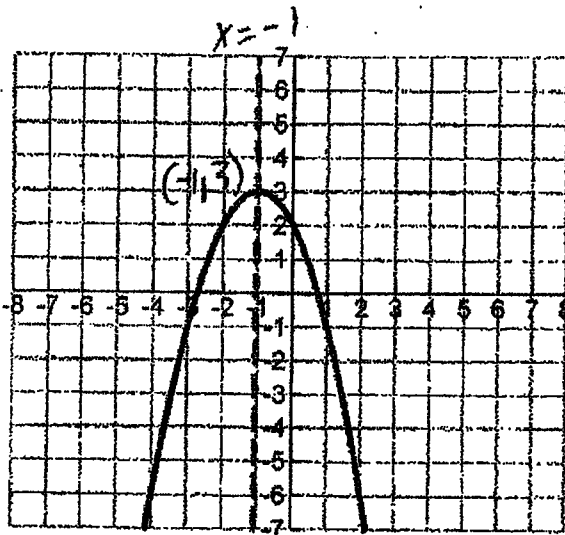
$$y = -(-1)^2 - 2(-1) + 2$$

$$= -1 + 2 + 2$$

$$= 3$$

VERTEX:  $(-1, 3)$

Axis of Sym:  $x = -1$



14. Factor the expressions completely

a.  $24x^2 - 38x - 25$

$(12x - 25)(2x + 1)$

c.  $27x^3 + 64$

$(3x + 4)(9x^2 - 12x + 16)$

b.  $324a^2 - 225$

$9(6a - 5)(6a + 5)$

d.  $9x^3 - 12x^2 - 48x + 64$

$(3x^2 - 16)(3x - 4)$

15. Simplify:

a.  $(17 - 11i) - (-1 + \sqrt{-381})$

$18 - 11i - i\sqrt{381}$

b.  $(12 - \sqrt{-169})(-2 - \sqrt{-529})$

$-323 - 250i$

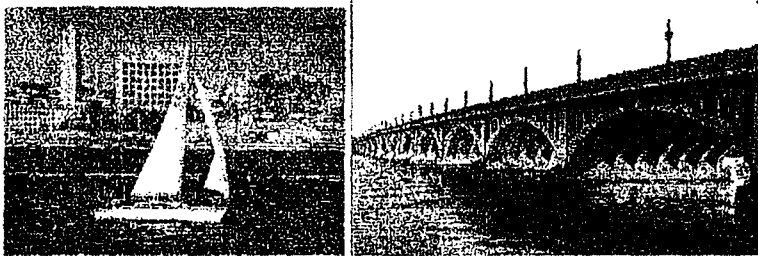
c.  $(4 + 9i) + (-22 + \sqrt{-81})$

$-18 + 18i$

d.  $(3 - \sqrt{-324})^2$

$-315 - 108i$

16. Ms. Guinn and her family enjoy spending time on their sailboat. One day, she was sailing and was approaching the Belle Isle Bridge (MacArthur Bridge). The height of the mast of her sailboat is 32 ft above the water. The arch of the bridge support is described by the equation:  $f(x) = -2x^2 + 20x - 13$ . Will Ms. Guinn be able to sail her boat under the bridge safely? If so, by how much? If not, how much will she miss by?



$x = \frac{-20}{2(-2)} = 5$

$f(5) = -2(5)^2 + 20(5) - 13$   
 $= -50 + 100 - 13$   
 $= 37$

Can She Make It Safely Under the Bridge?	YES
IF she <b>DOES</b> clear the bridge, by how many feet does she clear it?	5 FT
IF she <b>DOES NOT</b> clear the bridge, by how many feet does she miss?	

17. Madison has a motorboat that can go 8 miles downstream on a river in 24 minutes. It takes her 40 minutes for her boat to go back upstream the same 8 miles. Find the speed of the current and the speed of the boat.

$$8 = (r+c)\frac{2}{3}$$

$$8 = (r-c)\frac{4}{3}$$

$$20 = r+c$$

$$12 = r-c$$

$$32 = 2r$$

$$16 = r \quad c = 4$$

18. Olivia is a world-renowned chemist. She needs 12 liters of a 7% hydrochloric-acid solution. She has 4% hydrochloric-acid solution and 9% hydrochloric-acid solutions at her disposal to use. How much of each solution must Olivia mix with the other to create the 12 liters of 7% solution she requires?

$$a+b=12$$

$$a+b=12$$

$$4\% = a$$

$$9\% = b$$

$$.04a + .09b = .07(12)$$

$$.04a + .09a = .84$$

$$4a + 9b = 84$$

$$a + b = 12$$

$$4a + 9b = 84$$

$$-4a - 9b = -48$$

$$5b = 36$$

$$b = \frac{36}{5} \text{ L} \quad a = \frac{24}{5} \text{ L}$$

19. Lisa and Grace leave Seaholm High School traveling in opposite directions on a straight road. Lisa drives 30 miles per hour faster than Grace. After 4 hours they are 440 miles apart. Calculate how fast Lisa and Grace were each driving.

$$\text{GRACE} = r$$

$$\text{LISA} = r+30$$

$$4r + 4(r+30) = 440$$

$$8r + 120 = 440$$

$$8r = 320$$

$$r = 40 \quad r+30 = 70$$

Solve:

20.  $(x+5)^{\frac{2}{3}} = 4$

$$x+5 = 8$$

$$x = 3$$

21.  $\sqrt{5x-1}+3=x$

$$(\sqrt{5x-1})^2 = (x-3)^2$$

$$x = 10$$

$$5x-1 = x^2 - 6x + 9$$

$$0 = x^2 - 11x + 10$$

$$0 = (x-10)(x-1)$$

EXTRINSIC

22.  $(\sqrt{x+2} + \sqrt{3x}) = (\sqrt{6x-3})^2$

$$x+2 + 2\sqrt{3x^2+6x} + 3x = 6x-3$$

$$(2\sqrt{3x^2+6x})^2 = (2x-5)^2$$

$$4(3x^2+6x) = 4x^2 - 20x + 25$$

$$8x^2 + 44x - 25 = 0$$

$$x = \frac{-11 \pm 3\sqrt{19}}{4}$$

Simplify:

$$23. \left( \frac{9^{\frac{1}{4}} p^{\frac{3}{2}} w^{\frac{1}{2}}}{9^{\frac{3}{4}} p^2 w^{\frac{1}{3}}} \right)^{-2}$$

$$\left( \frac{w^{\frac{1}{6}}}{9^{\frac{1}{2}} p^{\frac{1}{2}}} \right)^{-2} = \frac{9p}{w^{\frac{1}{3}}}$$

Solve by Completing the Square:

$$25. 4x^2 - 24x - 72 = 0$$

$$x^2 - 6x - 18 = 0$$

$$\begin{aligned} & \begin{matrix} -6 \\ -3 \\ -3 \end{matrix} \quad x^2 - 6x + 9 = 18 + 9 \\ & (-3)^2 = 9 \quad (x-3)^2 = 27 \end{aligned}$$

$$x-3 = \pm 3\sqrt{3}$$

$$x = 3 \pm 3\sqrt{3}$$

Solve Using the Quadratic Formula:

$$27. 4x^2 - 24x - 72 = 0$$



$$x^2 - 6x - 18 = 0$$

$$x = \frac{6 \pm \sqrt{(-6)^2 - 4(1)(-18)}}{2(1)}$$

$$= \frac{6 \pm \sqrt{36 + 72}}{2}$$

$$= \frac{6 \pm 6\sqrt{3}}{2}$$

$$= 3 \pm 3\sqrt{3}$$

$$24. 4+7i + \frac{2+3i}{5-\sqrt{-256}}, \frac{5+16i}{5+16i}$$

$$4+7i + \frac{-38+47i}{281}$$

$$\frac{247+2014i}{281}$$

$$26. 3x^2 - 24x + 36 = 0$$

$$x^2 - 8x + 12 = -12 + 16$$

$$(x-4)^2 = 4$$

$$x-4 = \pm 2$$

$$x = 4 \pm 2$$

$$x = 6, 2$$

$$b = -8$$

$$\frac{b}{2} = -4$$

$$\left(\frac{b}{2}\right)^2 = 16$$

$$28. 3x^2 - 24x + 36 = 0$$

$$x^2 - 8x + 12 = 0$$

$$x = \frac{8 \pm \sqrt{(-8)^2 - 4(1)(12)}}{2(1)}$$

$$= \frac{8 \pm \sqrt{64 - 48}}{2}$$

$$= \frac{8 \pm \sqrt{16}}{2} = \frac{8 \pm 4}{2}$$

$$x = \frac{12}{2} \quad x = \frac{4}{2}$$

$$x = 6, 2$$

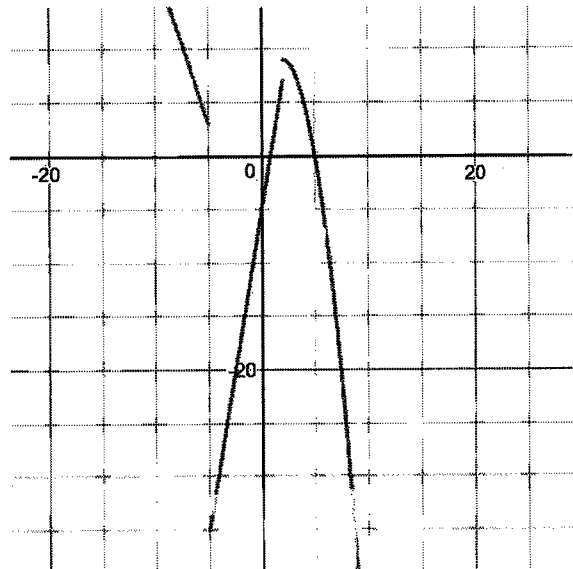
Solve Using the Quadratic Formula:

27.  $4x^2 - 24x - 72 = 0$

28.  $3x^2 - 24x + 36 = 0$

29. Graph the function if: (Be certain to label your graph appropriately)

$f(x)$	$-3x - 12$	$(-\infty, -5]$
	$6x - 5$	$(-5, 2]$
	$-(x-2)^2 + 9$	$(2, \infty)$



19. Given:  $f(x) = x^2 + 3x - 4$  and  $g(x) = 2x + 1$

Find the following:

a)  $(f \circ g)(x) = (2x+1)^2 + 3(2x+1) - 4 = 4x^2 + 10x$

b)  $f^{-1}(x) \quad x = y^2 + 3y - 4 \quad f^{-1}(x) = \frac{-3 \pm \sqrt{x+25}}{2}$  (COMPLETE THE SQUARE)

c)  $(g \circ f)(5) = 5^2 + 3(5) - 4 = 36$

$2(36) + 1 = 73$

