Chapter 4 (Part 2) Review Worksheet

Name: KEY

Solve the equation.

1.) $x^2 + 9 = 4$

$x^2 = -5$

$x = \pm\sqrt{-5}$

$\boxed{x = \pm i\sqrt{5}}$

2.) $x^2 = 2x^2 + 4$

$-x^2 = 4$

$x^2 = -4$

$x = \pm\sqrt{-4}$

$\boxed{x = \pm 2i}$

3.) $\frac{1}{3}x^2 + 10 = -23$

$\frac{1}{3}x^2 = -33$

$x^2 = -99$

$x = \pm\sqrt{-99}$ ← $\sqrt{-1}$, $\sqrt{9}$, $\sqrt{11}$

$\boxed{x = \pm 3i\sqrt{11}}$

4.) $-5x^2 - 3 = 97$

$-5x^2 = 100$

$x^2 = -20$

$x = \pm\sqrt{-20}$ ← $\sqrt{-1}$, $\sqrt{4}$, $\sqrt{5}$

$\boxed{x = \pm 2i\sqrt{5}}$

5.) $(x - 10)^2 = -54$

$x - 10 = \pm\sqrt{-54}$ ← $\sqrt{-1}$, $\sqrt{9}$, $\sqrt{6}$

$\boxed{x = 10 \pm 3i\sqrt{6}}$

6.) $-(x + 7)^2 + 8 = 44$

$-(x + 7)^2 = 36$

$(x + 7)^2 = -36$

$x + 7 = \pm\sqrt{-36}$ ← $\sqrt{-1}$, $\sqrt{36}$

$\boxed{x = -7 \pm 6i}$

Write the expression as a complex number in standard form.

7.) $(8 - 6i) + (7 + 4i)$

$8 + 7 - 6i + 4i$

$\boxed{15 - 2i}$

8.) $(2 - 3i) - (6 - 5i)$

$2 - 6 - 3i - (-5i)$

$\boxed{-4 + 2i}$

9.) $(3 + 4i) - (2 - 5i)$

$3 - 2 + 4i - (-5i)$

$\boxed{1 + 9i}$

10.) $-9i(2 - i)$

$-18i + 9i^2$

$-18i + 9(-1)$

$\boxed{-9 - 18i}$

11.) $(5 + i)(4 - 2i)$

$20 - 10i + 4i - 2i^2$

$20 - 6i - 2(-1)$

$20 - 6i + 2$

$\boxed{22 - 6i}$

12.) $(2 - 7i)(-8 - 3i)$

$-16 - 6i + 56i + 21i^2$

$-16 + 50i + 21(-1)$

$-16 + 50i - 21$

$\boxed{-37 + 50i}$

13.) $\frac{4i}{-3+6i} \cdot \frac{(-3-6i)}{(-3-6i)}$

$\frac{-12i-24i^2 \to (-1)}{9-36i^2 \to (-1)}$

$\frac{-12i+24}{9+36}$

$\frac{24-12i}{45}$

$\frac{24}{45} - \frac{12}{45}i \to \boxed{\frac{8}{15} - \frac{4}{15}i}$

14.) $\frac{3+i}{2-3i} \cdot \frac{(2+3i)}{(2+3i)}$

$\frac{6+9i+2i+3i^2 \to (-1)}{4-9i^2 \to (-1)}$

$\frac{6+11i-3}{4+9}$

$\frac{3+11i}{13}$

$\boxed{\frac{3}{13} + \frac{11}{13}i}$

15.) $\frac{5+i}{7+4i} \cdot \frac{(7-4i)}{7-4i}$

$\frac{35-20i+7i-4i^2 \to (-1)}{49-16i^2 \to (-1)}$

$\frac{35-13i+4}{49+16}$

$\frac{39-13i}{65}$

$\frac{39}{65} - \frac{13}{65}i \to \boxed{\frac{3}{5} - \frac{1}{5}i}$

Use the properties of exponents to write the complex number in standard form.

16.) $-5+i^7$ $4\overline{)7}$ R3, 1

i ① -1 ② $-i$ ③ 1 ④

$-5+(-i)$

$\boxed{-5-i}$

17.) $4+i^{29}$ $4\overline{)29}$ R1, 7

$4+(i)$

$\boxed{4+i}$

18.) $-11-2i^{66}$ $4\overline{)66}$ R2, 16

$-11-2(-1)$

$-11+2$

$\boxed{-9}$

19.) $15+7i^{76}$ $4\overline{)76}$ R0, 19

$15+7(1)$

$15+7$

$\boxed{22}$

Solve the equation by completing the square.

20.) $x^2+16x-17=0$ $\left(\frac{16}{2}\right)^2 \to (8)^2 \to 64$

$x^2+16x+\boxed{64} = 17+\boxed{64}$

$(x+8)^2 = 81$

$x+8 = \pm\sqrt{81}$

$x = -8 \pm 9$

$\boxed{x=1}$ $\boxed{x=-17}$

21.) $x^2-6x-15=0$ $\left(\frac{-6}{2}\right)^2 \to (-3)^2 \to 9$

$x^2-6x+\boxed{9} = 15+\boxed{9}$

$(x-3)^2 = 24$

$x-3 = \pm\sqrt{24} < \sqrt{4}\sqrt{6}$

$\boxed{x = 3 \pm 2\sqrt{6}}$

22.) $\frac{2x^2+8x-28}{2} = \frac{0}{2}$ $\left(\frac{4}{2}\right)^2 \to (2)^2 \to 4$

$x^2+4x-14=0$

$x^2+4x+\boxed{4} = 14+\boxed{4}$

$(x+2)^2 = 18$

$x+2 = \pm\sqrt{18} < \sqrt{9}\sqrt{2}$

$\boxed{x = -2 \pm 3\sqrt{2}}$

23.) $x^2+24x+244=0$ $\left(\frac{24}{2}\right)^2 \to (12)^2 \to 144$

$x^2+24x+\boxed{144} = -244+\boxed{144}$

$(x+12)^2 = -100$

$x+12 = \pm\sqrt{-100} < \sqrt{-1}\sqrt{100}$

$\boxed{x = -12 \pm 10i}$

...te the quadratic function in vertex form. Then identify the vertex.

24.) $y = x^2 + 14x + 39$

$(\frac{14}{2})^2 \to (7)^2 \to 49$

$49 + y = x^2 + 14x + 49 + 39$

$49 + y = (x+7)^2 + 39$

$y = (x+7)^2 - 10$

vertex: $(-7, -10)$

25.) $y = x^2 - 20x + 125$

$(\frac{-20}{2})^2 \to (-10)^2 \to 100$

$100 + y = x^2 - 20x + 100 + 125$

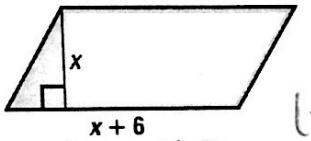
$100 + y = (x-10)^2 + 125$

$y = (x-10)^2 + 25$

vertex: $(10, 25)$

Find the value of *x*.

26.) Area of parallelogram = 48 units^2
$(A = b \bullet h)$



$(\frac{6}{2})^2 \to (3)^2 \to 9$

$x(x+6) = 48$

$x^2 + 6x = 48$

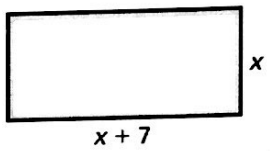
$x^2 + 6x + 9 = 48 + 9$

$(x+3)^2 = 57$

$x + 3 = \pm\sqrt{57}$

$x = -3 + \sqrt{57}$

27.) Area of rectangle = 78 units^2



$(\frac{7}{2})^2 \to \frac{49}{4}$

$x(x+7) = 78$

$x^2 + 7x = 78$

$x^2 + 7x + \frac{49}{4} = 78 + \frac{49}{4}$

$(x + \frac{7}{2})^2 = \frac{361}{4}$

$x + \frac{7}{2} = \pm\sqrt{\frac{361}{4}}$

$x + \frac{7}{2} = \pm\frac{19}{2}$

$x = -\frac{7}{2} + \frac{19}{2}$

$x = \frac{12}{2} = 6$

Use the quadratic equation to solve the equation.

28.) $x^2 + 4x - 3 = 0$
$a \quad b \quad c$

$x = \frac{-4 \pm \sqrt{(4)^2 - 4(1)(-3)}}{2(1)}$

$x = \frac{-4 \pm \sqrt{28}}{2}$ $\quad \sqrt{28} < \sqrt{4}\sqrt{7}$

$x = \frac{-4 \pm 2\sqrt{7}}{2}$

$x = -2 \pm \sqrt{7}$

29.) $9x^2 = -6x - 1$

$9x^2 + 6x + 1 = 0$
$a \quad b \quad c$

$x = \frac{-6 \pm \sqrt{(6)^2 - 4(9)(1)}}{2(9)}$

$x = \frac{-6 \pm \sqrt{0}}{18}$

$x = \frac{-6}{18} = \frac{-1}{3}$

30.) $6x^2 - 8x = -3$

$6x^2 - 8x + 3 = 0$
$a \quad b \quad c$

$x = \frac{-(-8) \pm \sqrt{(-8)^2 - 4(6)(3)}}{2(6)}$

$x = \frac{8 \pm \sqrt{-8}}{12}$ $\quad \sqrt{-8} < \sqrt{-1}\sqrt{4}\sqrt{2}$

$x = \frac{8 \pm 2i\sqrt{2}}{12} = \frac{4 \pm i\sqrt{2}}{6}$

31.) $3x^2 + 10x - 5 = 0$
$a \quad b \quad c$

$x = \frac{-10 \pm \sqrt{(10)^2 - 4(3)(-5)}}{2(3)}$

$x = \frac{-10 \pm \sqrt{160}}{6}$ $\quad \sqrt{160} < \sqrt{16}\sqrt{10}$

$x = \frac{-10 \pm 4\sqrt{10}}{6}$

$x = \frac{-5 \pm 2\sqrt{10}}{3}$

32.) A person spikes a volleyball over a net when the ball is 9 feet above the ground. The volleyball has an initial vertical velocity of -40 feet per second. The volleyball is allowed to fall to the ground. How long is the ball in the air after it is spiked?

$h = -16t^2 + v_0t + h_0$

$0 = -16t^2 - 40t + 9$

$t = \frac{-(-40) \pm \sqrt{(-40)^2 - 4(-16)(9)}}{2(-16)}$

$t = \frac{40 \pm \sqrt{2176}}{-32}$

$t \approx -2.71, 0.21$

about 0.21 seconds

33.) A juggler tosses a ball into the air. The ball leaves the juggler's hand 4 feet above the ground and has an initial vertical velocity of 40 feet per second. The juggler catches the ball when it falls back to a height of 3 feet. How long is the ball in the air?

$h = -16t^2 + v_0t + h_0$

$3 = -16t^2 + 40t + 4$

$0 = -16t^2 + 40t + 1$

$t = \frac{-40 \pm \sqrt{(40)^2 - 4(-16)(1)}}{2(-16)}$

$t = \frac{-40 \pm \sqrt{1664}}{-32}$

$t \approx -0.025, 2.525$

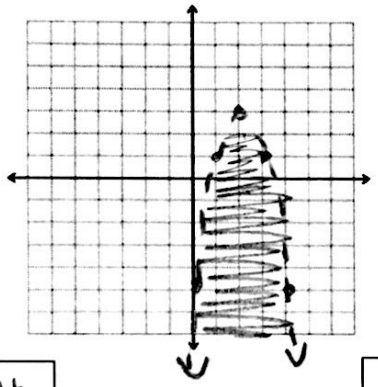
about 2.5 seconds

34.) $y < -2x^2 + 8x - 5$ (dashed)

AOS: $x = 2$

vertex: $(2, 3)$

$x = \frac{-b}{2a} = \frac{-8}{2(-2)} = \frac{-8}{-4} = 2$



x	0	1	2	3	4
y	-5	1	3	1	-5

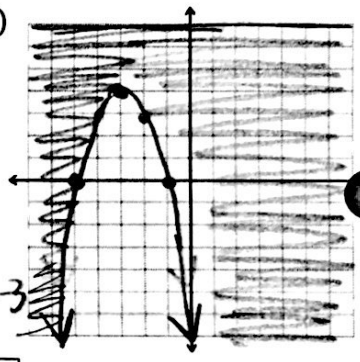
35.) $y \geq -(x+5)(x+1)$ (solid)

AOS: $x = -3$

vertex: $(-3, 4)$

x-int: $-5, -1$

$x = \frac{p+q}{2} = \frac{-5+-1}{2} = \frac{-6}{2} = -3$



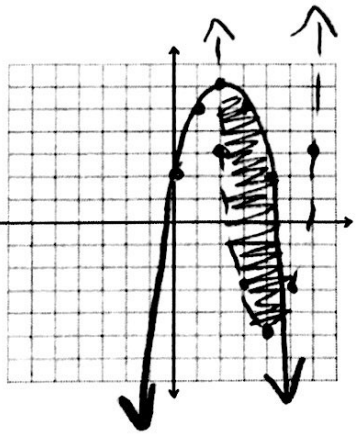
x	-5	-4	-3	-2	-1
y	0	3	4	3	0

36.) $y > 2(x-4)^2 - 5$ (dashed)

$y \leq -x^2 + 4x + 2$ (solid)

vertex: $(4, -5)$

x	y
3	-3
6	3



vertex: $(2, 6)$

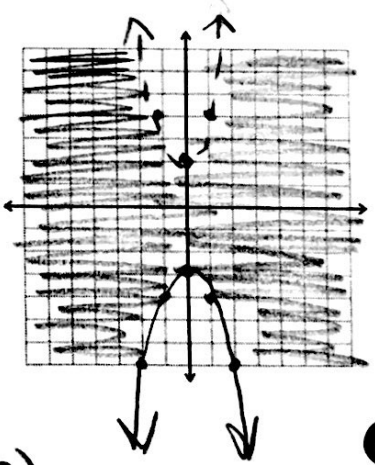
x	y
1	3
4	2

37.) $y < 2x^2 + 2$ (dashed)

$y \geq -x^2 - 3$ (solid)

vertex: $(0, 2)$

x	y
-1	4
2	10



Vertex: $(0, -3)$

x	y
-1	-4
2	-7