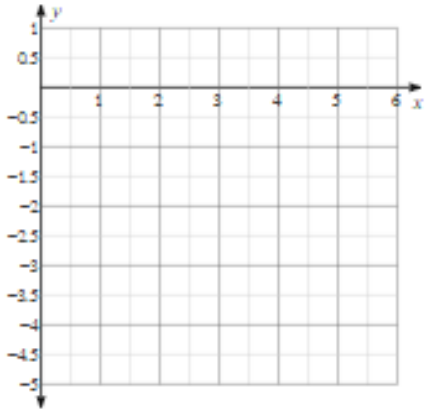
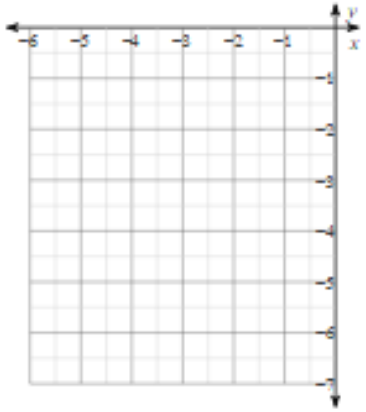
Graphing Quadratics Practice Problems

Graph each function. State and label the axis of symmetry, the coordinates of the vertex, and 2 other points. Show all work in a neat, organized manner. You must have at least 5 points, including the vertex.

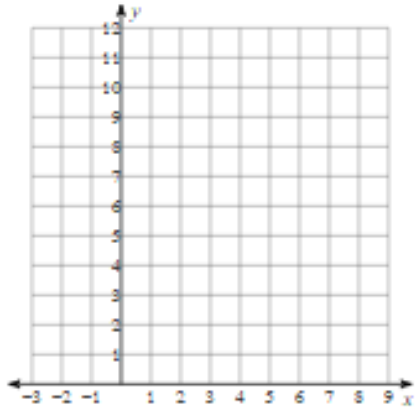
1) $y = x^2 - 6x + 5$



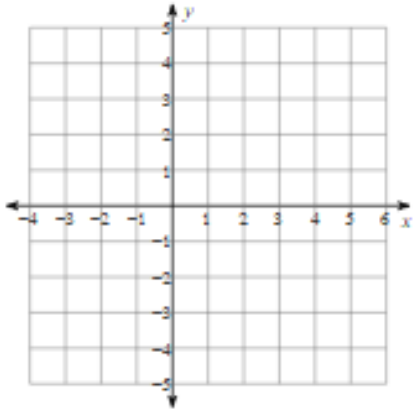
2) $y = -x^2 - 6x - 11$



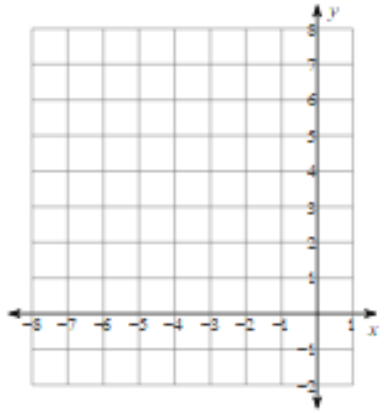
3) $y = 2x^2 - 12x + 21$



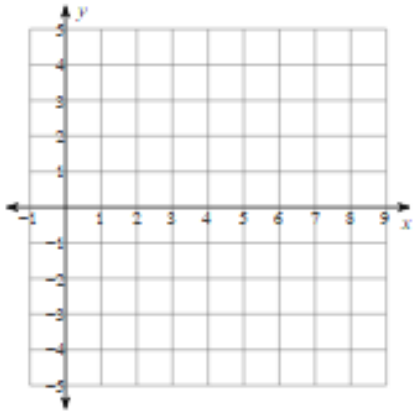
4) $y = -2x^2 - 8x - 4$



5) $y = 2x^2 + 16x + 31$



6) $y = -2x^2 + 12x - 14$



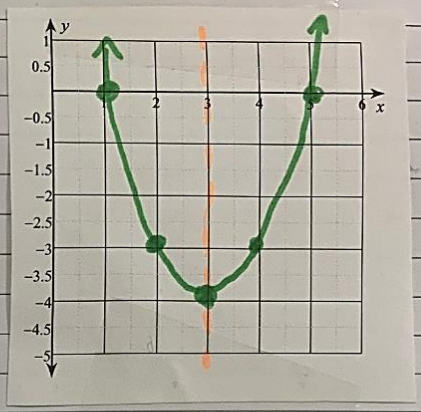
Graphing Quadratics Practice Answers

1.) $y = x^2 - 6x + 5$

- opens up ↑
- aos → $x = \frac{-b}{2a} = \frac{-(-6)}{2(1)} = \frac{6}{2} = 3$ $\boxed{x = 3}$

- vertex: $(x, y) \rightarrow \boxed{(3, -4)}$

$y = (3)^2 - 6(3) + 5$
$y = 9 - 18 + 5$
$y = -9 + 5$
$y = -4$



- points:

x	y
1	0
2	-3

$x = 1$
$y = 1^2 - 6(1) + 5$
$y = 1 - 6 + 5$
$y = -5 + 5$
$y = 0$

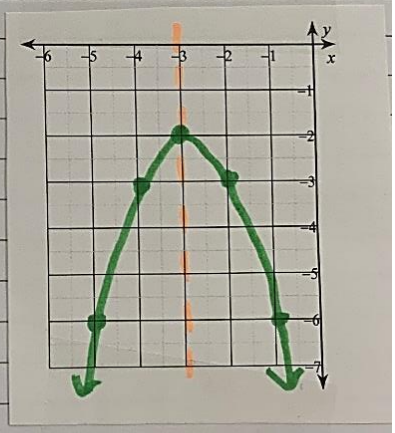
$x = 2$
$y = 2^2 - 6(2) + 5$
$y = 4 - 12 + 5$
$y = -8 + 5$
$y = -3$

2.) $y = -x^2 - 6x - 11$

- opens down ↓
- aos: $x = \frac{-b}{2a} = \frac{-(-6)}{2(-1)} = \frac{6}{-2} = -3$ $\boxed{x = -3}$

- vertex: $(x, y) \rightarrow \boxed{(-3, -2)}$

$y = -(-3)^2 - 6(-3) - 11$
$y = -9 + 18 - 11$
$y = 9 - 11$
$y = -2$



- points

x	y
-2	-3
-1	-6

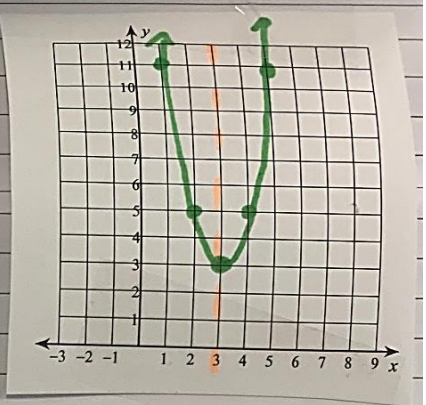
$x = -2$
$y = -(-2)^2 - 6(-2) - 11$
$y = -4 + 12 - 11$
$y = 8 - 11$
$y = -3$

$x = -1$
$y = -(-1)^2 - 6(-1) - 11$
$y = -1 + 6 - 11$
$y = 5 - 11$
$y = -6$

3.) $y = 2x^2 - 12x + 21$

- opens up ↻
- aos: $x = \frac{-b}{2a} = \frac{-(-12)}{2(2)} = \frac{12}{4} = 3$ $x=3$
- vertex: $(x,y) \rightarrow (3,3)$

$y = 2(3)^2 - 12(3) + 21$
$y = 2(9) - 36 + 21$
$y = 18 - 36 + 21$
$y = -18 + 21$
$y = 3$



- points:

x	y
1	11
2	5

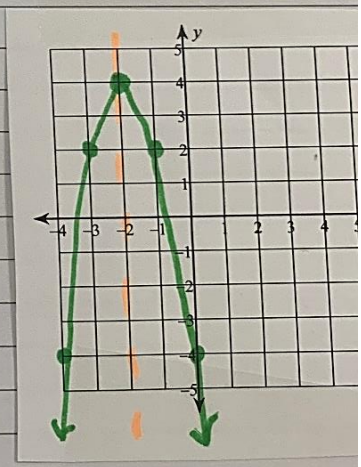
$x=1$
$y = 2(1)^2 - 12(1) + 21$
$y = 2 - 12 + 21$
$y = -10 + 21$
$y = 11$

$x=2$
$y = 2(2)^2 - 12(2) + 21$
$y = 2(4) - 24 + 21$
$y = 8 - 24 + 21$
$y = -16 + 21$
$y = 5$

4.) $y = -2x^2 - 8x - 4$

- opens down ↺
- aos $x = \frac{-b}{2a} = \frac{-(-8)}{2(-2)} = \frac{8}{-4} = -2$ $x=-2$
- vertex: $(x,y) \rightarrow (-2,4)$

$y = -2(-2)^2 - 8(-2) - 4$
$y = -2(4) + 16 - 4$
$y = -8 + 16 - 4$
$y = 8 - 4$
$y = 4$



- points

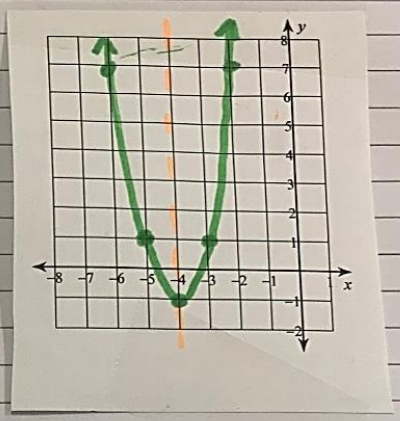
x	y
-1	2
0	-4

$x=-1$
$y = -2(-1)^2 - 8(-1) - 4$
$= -2 + 8 - 4$
$= 6 - 4$
$= 2$

$x=0$
$y = -2(0)^2 - 8(0) - 4$
$y = 0 - 0 - 4$
$y = -4$

5.) $y = 2x^2 + 16x + 31$

- opens up ∪
- aos: $x = \frac{-b}{2a} = \frac{-16}{2(2)} = \frac{-16}{4} = -4$ $x = -4$



- vertex: $(x, y) \rightarrow (-4, -1)$

$y = 2(-4)^2 + 16(-4) + 31$
$y = 2(16) - 64 + 31$
$y = 32 - 64 + 31$
$y = -32 + 31$
$y = -1$

- points:

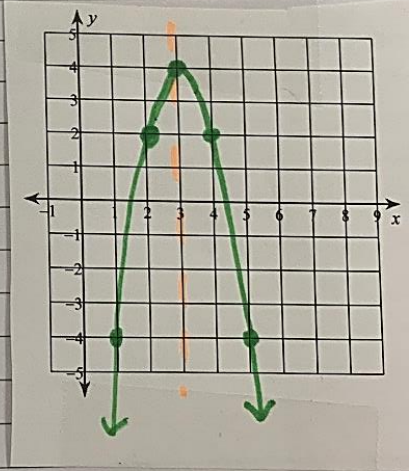
x	y
-3	1
-2	7

$x = -3$
$y = 2(-3)^2 + 16(-3) + 31$
$y = 2(9) - 48 + 31$
$y = 18 - 48 + 31$
$y = -30 + 31$
$= 1$

$x = -2$
$y = 2(-2)^2 + 16(-2) + 31$
$y = 2(4) - 32 + 31$
$= 8 - 32 + 31$
$= -24 + 31$
$= 7$

6.) $y = -2x^2 + 12x - 14$

- opens down ∩
- aos: $x = \frac{-b}{2a} = \frac{-12}{2(-2)} = \frac{-12}{-4} = 3$ $x = 3$



- vertex $(x, y) \rightarrow (3, 4)$

$y = -2(3)^2 + 12(3) - 14$
$y = -2(9) + 36 - 14$
$y = -18 + 36 - 14$
$y = 18 - 14 = 4$

- points

x	y
1	-4
2	2

$x = 1$
$y = -2(1)^2 + 12(1) - 14$
$= -2 + 12 - 14$
$= 10 - 14 = -4$

$x = 2$
$y = -2(2)^2 + 12(2) - 14$
$y = -2(4) + 24 - 14$
$y = -8 + 24 - 14$
$y = 16 - 14 = 2$

Solving Quadratics by taking square roots practice problems

Solve each quadratic equation by taking square roots. Show all work. Make sure your answer is completely simplified. Circle your final answer(s).

7) $-4+64p^2=96$

8) $16x^2-1=0$

9) $36r^2-1=15$

10) $2m^2-2=16$

11) $3x^2+4=22$

12) $4k^2-1=15$

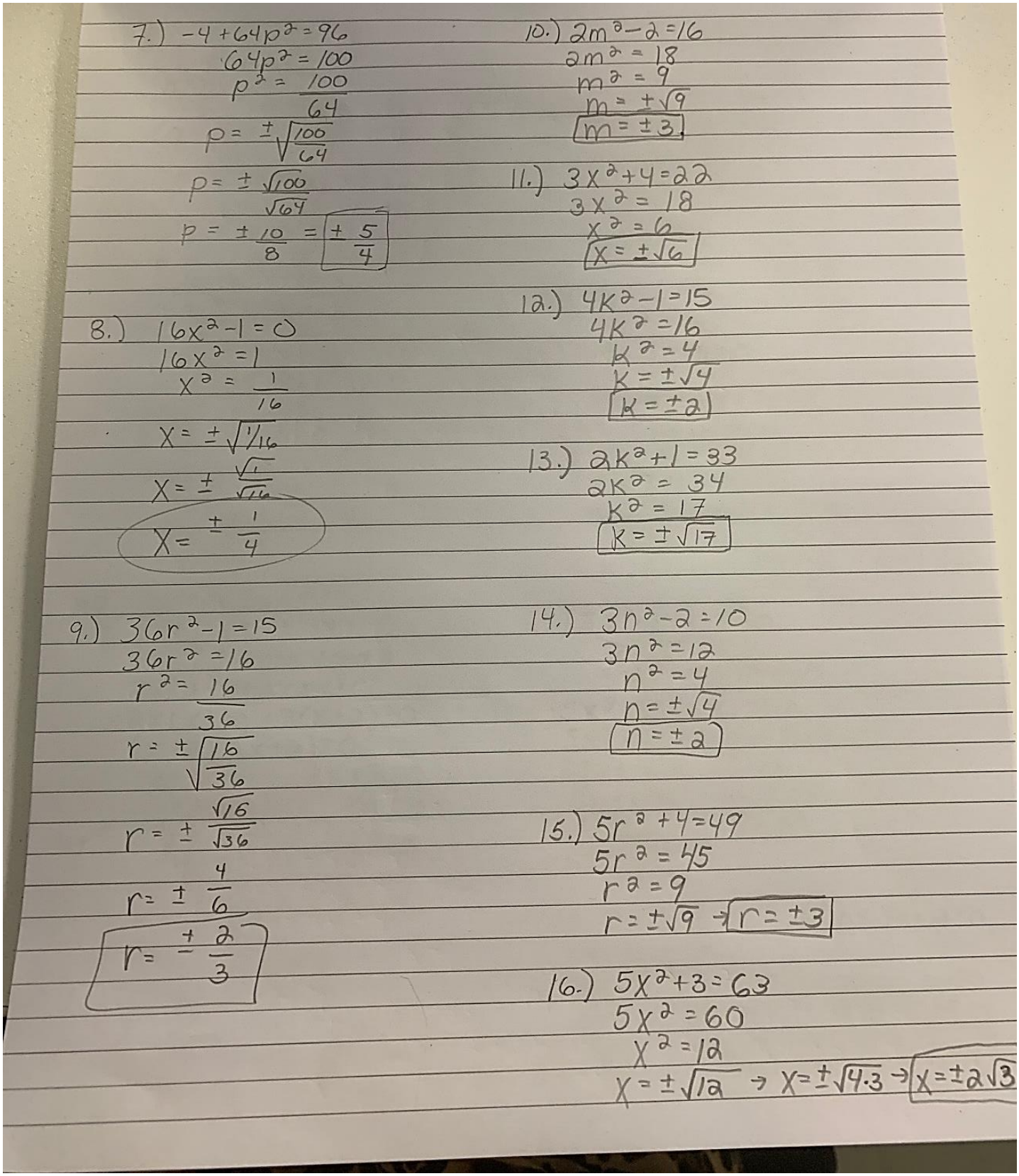
13) $2k^2+1=33$

14) $3n^2-2=10$

15) $5r^2+4=49$

16) $5x^2+3=63$

Solving Quadratics by taking square roots practice answers



7.) $-4+64p^2=96$
$64p^2=100$
$p^2=\frac{100}{64}$
$p=\pm\sqrt{\frac{100}{64}}$
$p=\pm\frac{\sqrt{100}}{\sqrt{64}}$
$p=\pm\frac{10}{8}=\boxed{\pm\frac{5}{4}}$

8.) $16x^2-1=0$
$16x^2=1$
$x^2=\frac{1}{16}$
$x=\pm\sqrt{\frac{1}{16}}$
$x=\pm\frac{\sqrt{1}}{\sqrt{16}}$
$x=\pm\frac{1}{4}$

9.) $36r^2-1=15$
$36r^2=16$
$r^2=\frac{16}{36}$
$r=\pm\sqrt{\frac{16}{36}}$
$r=\pm\frac{\sqrt{16}}{\sqrt{36}}$
$r=\pm\frac{4}{6}$
$\boxed{r=\pm\frac{2}{3}}$

10.) $2m^2-2=16$
$2m^2=18$
$m^2=9$
$m=\pm\sqrt{9}$
$\boxed{m=\pm3}$

11.) $3x^2+4=22$
$3x^2=18$
$x^2=6$
$\boxed{x=\pm\sqrt{6}}$

12.) $4k^2-1=15$
$4k^2=16$
$k^2=4$
$k=\pm\sqrt{4}$
$\boxed{k=\pm2}$

13.) $2k^2+1=33$
$2k^2=34$
$k^2=17$
$\boxed{k=\pm\sqrt{17}}$

14.) $3n^2-2=10$
$3n^2=12$
$n^2=4$
$n=\pm\sqrt{4}$
$\boxed{n=\pm2}$

15.) $5r^2+4=49$
$5r^2=45$
$r^2=9$
$r=\pm\sqrt{9}\rightarrow\boxed{r=\pm3}$

16.) $5x^2+3=63$
$5x^2=60$
$x^2=12$
$x=\pm\sqrt{12}\rightarrow x=\pm\sqrt{4\cdot3}\rightarrow\boxed{x=\pm2\sqrt{3}}$

Solving Quadratics by Factoring Practice Problems

Solve each quadratic equation by factoring. Show all work. Make sure your answer is completely simplified. Circle your final answer(s).

17) $a^2 + 7a + 12 = 0$

18) $x^2 - 3x - 18 = 0$

19) $7n^2 - 28 = 0$

20) $2x^2 + 6x + 4 = 0$

21) $3x^2 + 21x = 0$

22) $7n^2 - 41n - 6 = 0$

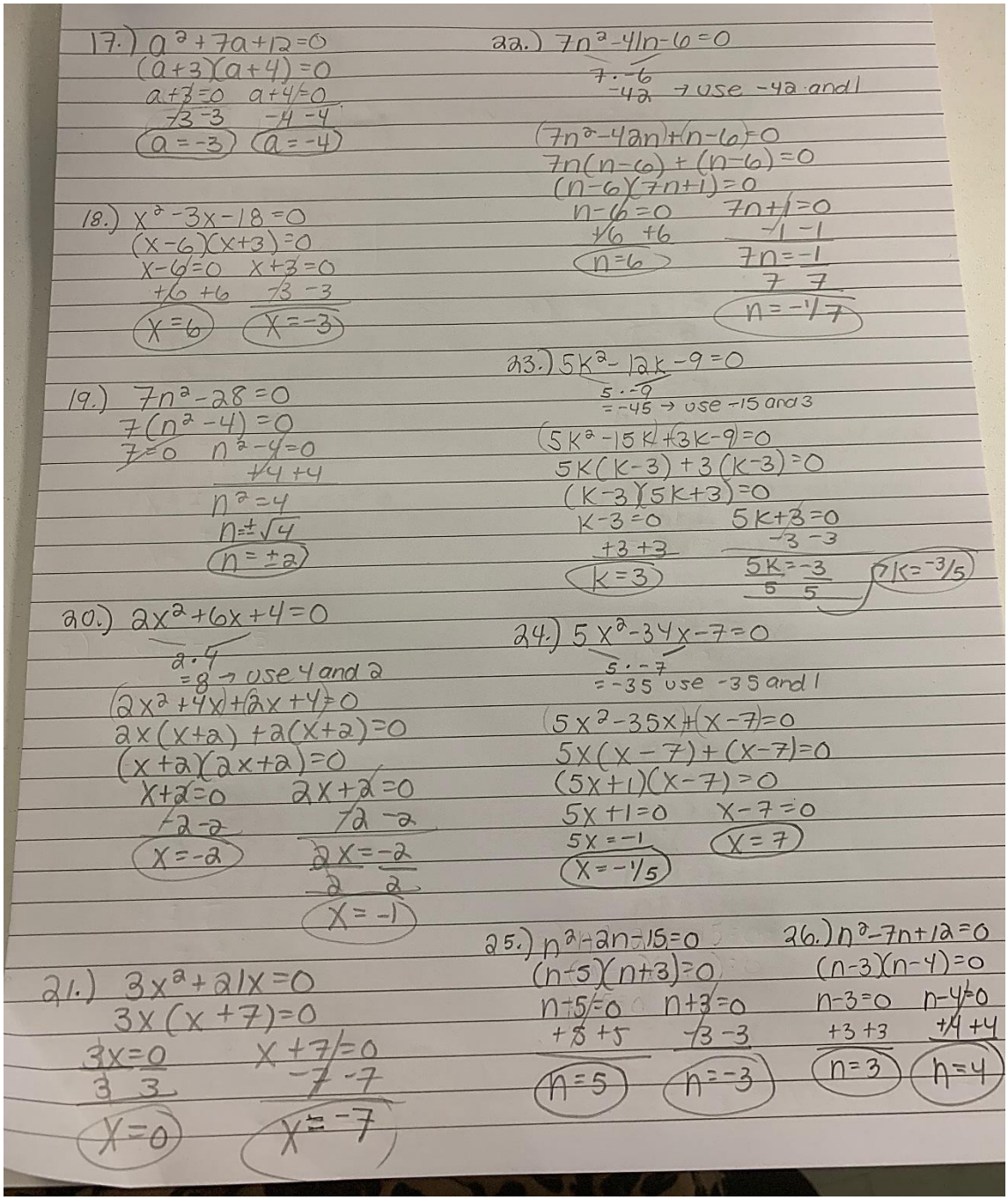
23) $5k^2 - 12k - 9 = 0$

24) $5x^2 - 34x - 7 = 0$

25) $n^2 - 2n - 15 = 0$

26) $n^2 - 7n + 12 = 0$

Solving Quadratics by Factoring Practice Answers



17.) $a^2+7a+12=0$
$(a+3)(a+4)=0$
$a+3=0$ $a+4=0$
$-3\ -3$ $-4\ -4$
$a=-3$ $a=-4$

18.) $x^2-3x-18=0$
$(x-6)(x+3)=0$
$x-6=0$ $x+3=0$
$+6\ +6$ $-3\ -3$
$x=6$ $x=-3$

19.) $7n^2-28=0$
$7(n^2-4)=0$
$7=0$ $n^2-4=0$
$+4\ +4$
$n^2=4$
$n=\pm\sqrt{4}$
$n=\pm 2$

20.) $2x^2+6x+4=0$
$2\cdot 4=8$ → use 4 and 2
$(2x^2+4x)+(2x+4)=0$
$2x(x+2)+2(x+2)=0$
$(x+2)(2x+2)=0$
$x+2=0$ $2x+2=0$
$-2\ -2$ $-2\ -2$
$x=-2$ $\frac{2x}{2}=\frac{-2}{2}$
$x=-1$

21.) $3x^2+21x=0$
$3x(x+7)=0$
$\frac{3x}{3}=\frac{0}{3}$ $x+7=0$
$x=0$ $-7\ -7$
$x=-7$

22.) $7n^2-41n-6=0$
$7\cdot -6=-42$ → use -42 and 1
$(7n^2-42n)+(n-6)=0$
$7n(n-6)+(n-6)=0$
$(n-6)(7n+1)=0$
$n-6=0$ $7n+1=0$
$+6\ +6$ $-1\ -1$
$n=6$ $\frac{7n}{7}=\frac{-1}{7}$
$n=-1/7$

23.) $5k^2-12k-9=0$
$5\cdot -9=-45$ → use -15 and 3
$(5k^2-15k)+(3k-9)=0$
$5k(k-3)+3(k-3)=0$
$(k-3)(5k+3)=0$
$k-3=0$ $5k+3=0$
$+3\ +3$ $-3\ -3$
$k=3$ $\frac{5k}{5}=\frac{-3}{5}$
$k=-3/5$

24.) $5x^2-34x-7=0$
$5\cdot -7=-35$ use -35 and 1
$5x^2-35x+(x-7)=0$
$5x(x-7)+(x-7)=0$
$(5x+1)(x-7)=0$
$5x+1=0$ $x-7=0$
$\frac{5x}{5}=\frac{-1}{5}$ $x=7$
$x=-1/5$

25.) $n^2+2n-15=0$
$(n-5)(n+3)=0$
$n-5=0$ $n+3=0$
$+5\ +5$ $-3\ -3$
$n=5$ $n=-3$

26.) $n^2-7n+12=0$
$(n-3)(n-4)=0$
$n-3=0$ $n-4=0$
$+3\ +3$ $+4\ +4$
$n=3$ $n=4$

Solving Quadratics by Completing the Square Practice Problems

Solve each quadratic equation by completing the square. Show all work. Make sure your answer is completely simplified. Circle your final answer(s).

27) $x^2 + 14x - 51 = 0$

28) $a^2 + 6a - 12 = 0$

29) $n^2 - 4n - 32 = 0$

30) $k^2 + 14k + 45 = 0$

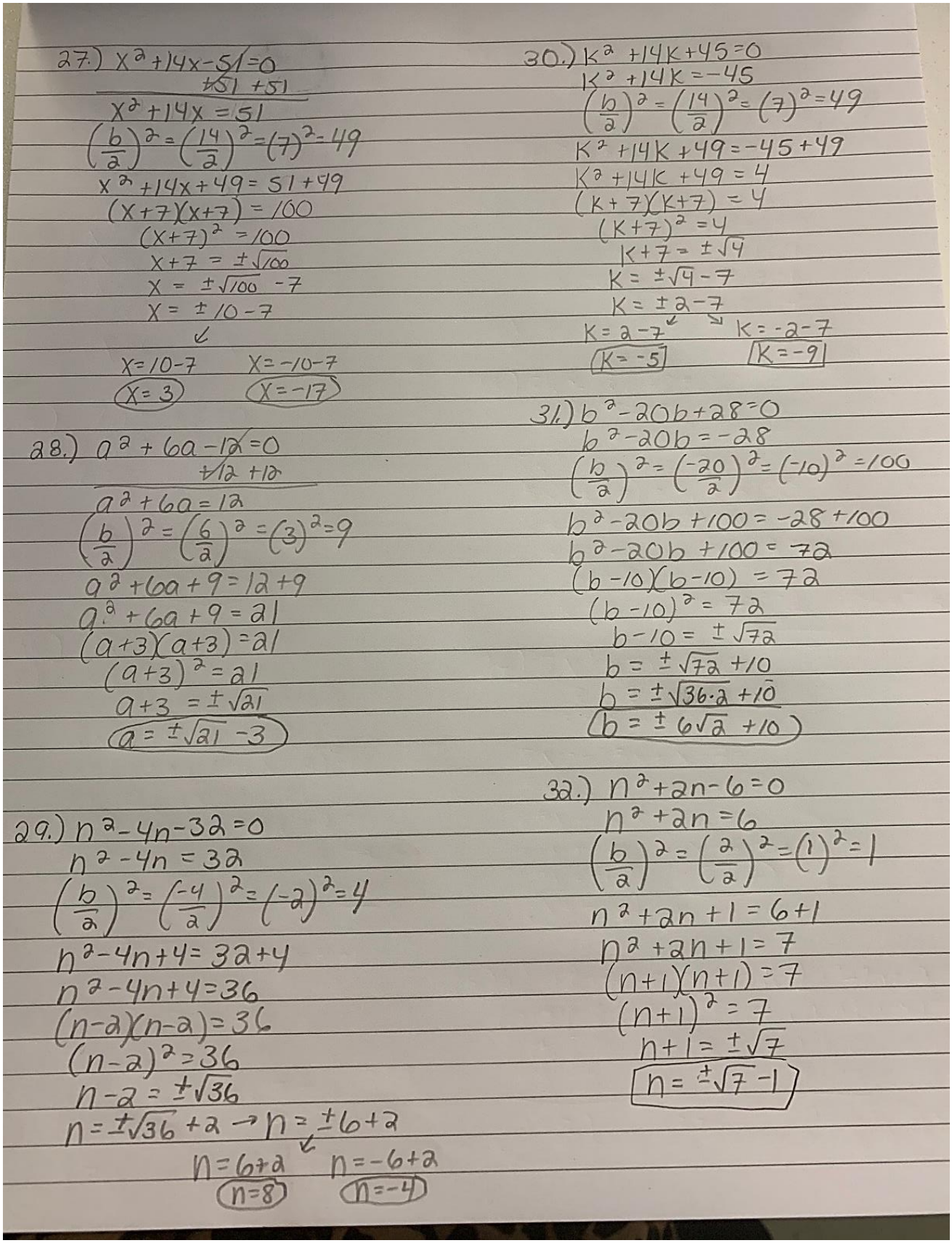
31) $b^2 - 20b + 28 = 0$

32) $n^2 + 2n - 6 = 0$

33) $b^2 - 2b - 2 = 0$

34) $p^2 + 6p + 8 = 0$

Solving Quadratics by Completing the Square Practice Answers



27.) $x^2+14x-51=0$

$+51 \quad +51$

$x^2+14x=51$

$\left(\frac{b}{2}\right)^2=\left(\frac{14}{2}\right)^2=(7)^2=49$

$x^2+14x+49=51+49$

$(x+7)(x+7)=100$

$(x+7)^2=100$

$x+7=\pm\sqrt{100}$

$x=\pm\sqrt{100}-7$

$x=\pm 10-7$

$x=10-7 \qquad x=-10-7$

$x=3 \qquad x=-17$

28.) $a^2+6a-12=0$

$+12 \quad +12$

$a^2+6a=12$

$\left(\frac{b}{2}\right)^2=\left(\frac{6}{2}\right)^2=(3)^2=9$

$a^2+6a+9=12+9$

$a^2+6a+9=21$

$(a+3)(a+3)=21$

$(a+3)^2=21$

$a+3=\pm\sqrt{21}$

$a=\pm\sqrt{21}-3$

29.) $n^2-4n-32=0$

$n^2-4n=32$

$\left(\frac{b}{2}\right)^2=\left(\frac{-4}{2}\right)^2=(-2)^2=4$

$n^2-4n+4=32+4$

$n^2-4n+4=36$

$(n-2)(n-2)=36$

$(n-2)^2=36$

$n-2=\pm\sqrt{36}$

$n=\pm\sqrt{36}+2 \rightarrow n=\pm 6+2$

$n=6+2 \qquad n=-6+2$

$n=8 \qquad n=-4$

30.) $k^2+14k+45=0$

$k^2+14k=-45$

$\left(\frac{b}{2}\right)^2=\left(\frac{14}{2}\right)^2=(7)^2=49$

$k^2+14k+49=-45+49$

$k^2+14k+49=4$

$(k+7)(k+7)=4$

$(k+7)^2=4$

$k+7=\pm\sqrt{4}$

$k=\pm\sqrt{4}-7$

$k=\pm 2-7$

$k=2-7 \qquad k=-2-7$

$k=-5 \qquad k=-9$

31.) $b^2-20b+28=0$

$b^2-20b=-28$

$\left(\frac{b}{2}\right)^2=\left(\frac{-20}{2}\right)^2=(-10)^2=100$

$b^2-20b+100=-28+100$

$b^2-20b+100=72$

$(b-10)(b-10)=72$

$(b-10)^2=72$

$b-10=\pm\sqrt{72}$

$b=\pm\sqrt{72}+10$

$b=\pm\sqrt{36\cdot 2}+10$

$b=\pm 6\sqrt{2}+10$

32.) $n^2+2n-6=0$

$n^2+2n=6$

$\left(\frac{b}{2}\right)^2=\left(\frac{2}{2}\right)^2=(1)^2=1$

$n^2+2n+1=6+1$

$n^2+2n+1=7$

$(n+1)(n+1)=7$

$(n+1)^2=7$

$n+1=\pm\sqrt{7}$

$n=\pm\sqrt{7}-1$

33.) $b^2 - 2b - 2 = 0$

$b^2 - 2b = 2$

$\left(\frac{b}{2}\right)^2 = \left(\frac{-2}{2}\right)^2 = (-1)^2 = 1$

$b^2 - 2b + 1 = 2 + 1$

$b^2 - 2b + 1 = 3$

$(b-1)(b-1) = 3$

$(b-1)^2 = 3$

$b - 1 = \pm\sqrt{3}$

$b = \pm\sqrt{3} + 1$

34.) $p^2 + 6p + 8 = 0$

$p^2 + 6p = -8$

$\left(\frac{b}{2}\right)^2 = \left(\frac{b}{2}\right)^2 = (3)^2 = 9$

$p^2 + 6p + 9 = -8 + 9$

$p^2 + 6p + 9 = 1$

$(p+3)(p+3) = 1$

$(p+3)^2 = 1$

$p + 3 = \pm\sqrt{1}$

$p = \pm\sqrt{1} - 3$

$p = \pm 1 - 3$

$p = 1 - 3$

$p = -2$

$p = -1 - 3$

$p = -4$

Solving Quadratics by using the Quadratic Formula Practice Problems

Solve each equation with the quadratic formula.

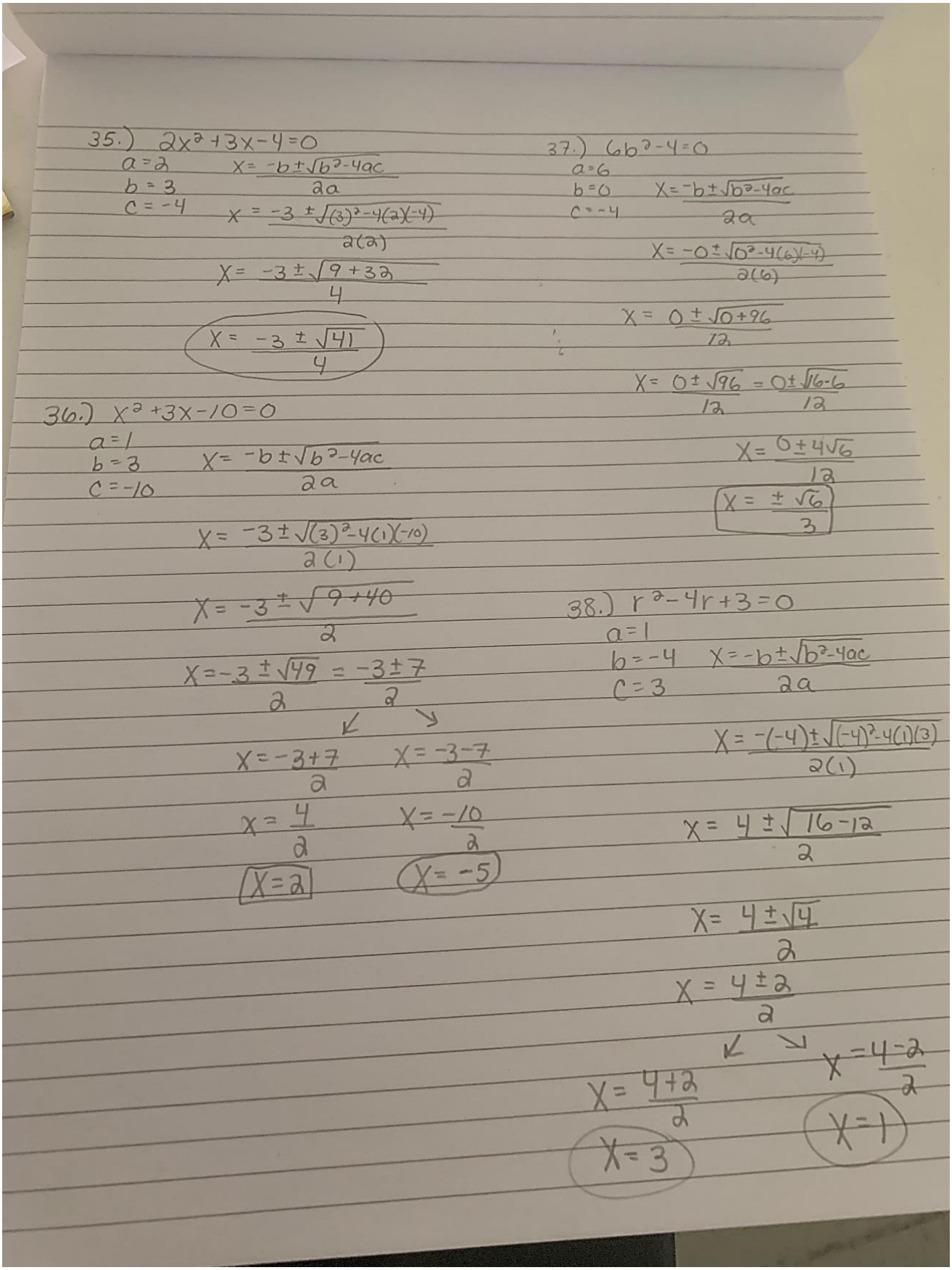
35) $2x^2 + 3x - 4 = 0$

36) $x^2 + 3x - 10 = 0$

37) $6b^2 - 4 = 0$

38) $r^2 - 4r + 3 = 0$

Solving Quadratics by using the Quadratic Formula Practice Answers



35.) $2x^2+3x-4=0$

$a=2$, $b=3$, $c=-4$

$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$

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

$x=\frac{-3\pm\sqrt{9+32}}{4}$

$x=\frac{-3\pm\sqrt{41}}{4}$

36.) $x^2+3x-10=0$

$a=1$, $b=3$, $c=-10$

$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$

$x=\frac{-3\pm\sqrt{(3)^2-4(1)(-10)}}{2(1)}$

$x=\frac{-3\pm\sqrt{9+40}}{2}$

$x=\frac{-3\pm\sqrt{49}}{2}=\frac{-3\pm7}{2}$

$x=\frac{-3+7}{2}$ $\quad$ $x=\frac{-3-7}{2}$

$x=\frac{4}{2}$ $\quad$ $x=\frac{-10}{2}$

$x=2$ $\quad$ $x=-5$

37.) $6b^2-4=0$

$a=6$, $b=0$, $c=-4$

$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$

$x=\frac{-0\pm\sqrt{0^2-4(6)(-4)}}{2(6)}$

$x=\frac{0\pm\sqrt{0+96}}{12}$

$x=\frac{0\pm\sqrt{96}}{12}=\frac{0\pm\sqrt{16\cdot6}}{12}$

$x=\frac{0\pm4\sqrt{6}}{12}$

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

38.) $r^2-4r+3=0$

$a=1$, $b=-4$, $c=3$

$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$

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

$x=\frac{4\pm\sqrt{16-12}}{2}$

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

$x=\frac{4\pm2}{2}$

$x=\frac{4+2}{2}$ $\quad$ $x=\frac{4-2}{2}$

$x=3$ $\quad$ $x=1$