Worksheet 9 Solutions

(1) $x^2 = 49$

$x = \pm\sqrt{49}$

$\boxed{x = \pm 7}$

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(2) $b^2 = -4$

-4 not a positive number

$\boxed{\text{No answer}}$

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(3) $d^2 - 250 = 0$

$d^2 = 250$

$d = \pm\sqrt{250}$

$\boxed{d = \pm 5\sqrt{10}}$

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(4) $x^2 = \frac{9}{25}$

$x = \pm\sqrt{\frac{9}{25}}$

$x = \pm \frac{\sqrt{9}}{\sqrt{25}}$

$\boxed{x = \pm \frac{3}{5}}$

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(5) $(x+4)^2 = 25$

$x+4 = 5 \quad x+4 = -5$

$\boxed{x = 1} \quad \boxed{x = -9}$

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(6) $(y-9)^2 = 49$

$y-9 = 7 \quad y-9 = -7$

$\boxed{y = 16} \quad \cancel{y = 2}$

$\boxed{y = 2}$

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(7) $(3p-2)^2 - 28 = 0$

$(3p-2)^2 = 28$

$3p - 2 = \pm\sqrt{28} = \pm\sqrt{4 \cdot 7} = \pm 2\sqrt{7}$

$3p = 2 \pm 2\sqrt{7}$

$p = \frac{2}{3} \pm \frac{2}{3}\sqrt{7}$

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(8) $(7p-4)^2 = -81$

$7p - 4 = \sqrt{-81}$ ← not real

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(9) $x^2 - 2x = 15$

$x^2 - 2x \underline{+1} = 15 \underline{+1}$

$(x-1)^2 = 16$

$x - 1 = \pm\sqrt{16}$

$x - 1 = 4 \quad x - 1 = -4$

$\boxed{x = 5} \quad \boxed{x = -3}$

$-2 = 2k$

$-1 = k$

$k^2 = 1$

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(10) $p^2 + 6p = 0$

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

$(p+3)^2 = 9$

$p + 3 = \pm\sqrt{9} \rightarrow p+3 = -3 \quad p+3 = 3$

$\boxed{p = -6} \quad \boxed{p = 0}$

$6 = 2k$

$3 = k$

$k^2 = 9$

Worksheet 9 Solutions

(11) $m^2 - 6m = -12$

$-6 = 2k$

$-3 = k$

$k^2 = 9$

$m^2 - 6m + 9 = -12 + 9$

$(m-3)^2 = -3$

$(m-3) = \pm\sqrt{-3}$

Not a real number

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(12) $d^2 + 10d - 11 = 0$

$d^2 + 10d = 11$

$10 = 2k$

$5 = k$

$k^2 = 25$

$d^2 + 10d + 25 = 11 + 25$

$(d+5)^2 = 36$

$d + 5 = \pm 6$

$d + 5 = 6$ $\qquad$ $d + 5 = -6$

$\boxed{d = 1}$ $\qquad$ $\boxed{d = -11}$

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(13) $2x^2 - 13x + 20 = 0$

$x^2 - \frac{13}{2}x + 10 = 0$

$x^2 - \frac{13}{2}x = -10$

$-\frac{13}{2} = 2k$

$-\frac{13}{4} = k$

$\frac{169}{16} = k^2$

$x^2 - \frac{13}{2}x + \frac{169}{16} = \frac{-160}{16} + \frac{169}{16}$

$(x - 13/4)^2 = \frac{9}{16}$

$x - 13/4 = \pm\frac{3}{4}$

$x = \frac{16}{4} = \boxed{4}$ $\qquad$ $x = \frac{10}{4} = \boxed{\frac{5}{2}}$

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(14) $3n^2 - 7n + 2 = 0$

$n^2 - \frac{7}{3}n + \frac{2}{3} = 0$

$n^2 - \frac{7}{3}n = -\frac{2}{3}$

$-\frac{7}{3} = 2k$

$-\frac{7}{6} = k$

$k^2 = \frac{49}{36}$

$n^2 - \frac{7}{3}n + \frac{49}{36} = -\frac{2}{3} + \frac{49}{36}$

$(n - 7/6)^2 = -\frac{24}{36} + \frac{49}{36} = \frac{25}{36}$

$n - 7/6 = \pm\sqrt{\frac{25}{36}}$

$n - 7/6 = \frac{5}{6}$ $\qquad$ $n - \frac{7}{6} = -\frac{5}{6}$

$n = \frac{12}{6}$ $\qquad$ $n = \frac{2}{6}$

$\boxed{n = 2}$ $\qquad$ $\boxed{n = 1/3}$

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(15) $4y^2 + 6y = 2y + 3$

$\frac{4y^2}{4} + \frac{4y}{4} = \frac{3}{4}$

$y^2 + y = 3/4$

$1 = 2k$

$1/2 = k \rightarrow k^2 = \frac{1}{4}$

$y^2 + y + \frac{1}{4} = \frac{3}{4} + \frac{1}{4}$

$(y + \frac{1}{2})^2 = 1$

$y + \frac{1}{2} = \pm\sqrt{1}$

$y = -1 - \frac{1}{2}$ $\qquad$ $y = 1 - \frac{1}{2}$

$\boxed{y = -3/2}$ $\qquad$ $\boxed{y = 1/2}$

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(16) $6y^2 + 3y = 4y^2 + y - 5$

$\frac{2y^2}{2} + \frac{2y}{2} = \frac{-5}{2}$

$y^2 + y = -\frac{5}{2}$

$1 = 2k$

$\frac{1}{2} = k$

$k^2 = \frac{1}{4}$

$y^2 + y + \frac{1}{4} = -\frac{5}{2} + \frac{1}{4}$

$(y + \frac{1}{2})^2 = -\frac{10}{4} + \frac{1}{4} = \frac{-9}{4}$

$y + \frac{1}{2} = \pm\sqrt{\frac{-9}{4}}$

not a real number

(17) $(x-1)(x+2) = 4$

$x^2 + x - 2 = 4$

$x^2 + x = 6$

$1 = 2k$

$\frac{1}{2} = k$

$k^2 = \frac{1}{4}$

$x^2 + x + \frac{1}{4} = 6 + \frac{1}{4}$

$(x + \frac{1}{2})^2 = \frac{25}{4}$

$x + \frac{1}{2} = \pm\sqrt{\frac{25}{4}}$

$x + \frac{1}{2} = \frac{5}{2}$ $\quad x + \frac{1}{2} = \frac{-5}{2}$

$\boxed{x = \frac{4}{2} = 2}$ $\quad x = -\frac{6}{2}$

$\boxed{x = -3}$

(18) $3x^2 - 4x + 2 = 0$

(19) $2x^2 + 7x = 0$

(20) $3d^2 = 2d - 4$

$3d^2 - 2d + 4 = 0$

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(21) $3x^2 - 7x - 6 = 0$

$a = 3 \quad b = -7 \quad c = -6$

$x = \frac{7 \pm \sqrt{(-7)^2 - 4(3)(-6)}}{2(3)}$

$x = \frac{7 \pm \sqrt{49 + 72}}{6}$

$x = \frac{7 \pm \sqrt{121}}{6} = \frac{7 \pm 11}{6}$

$x = \frac{7+11}{6}$ $\quad x = \frac{7-11}{6}$

$\boxed{x = 3}$ $\quad x = -\frac{4}{6} = \boxed{-\frac{2}{3}}$

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(22) $n^2 + 4n - 5 = 0$

$a = 1 \quad b = 4 \quad c = -5$

$x = \frac{-4 \pm \sqrt{4^2 - 4(1)(-5)}}{2}$

$x = \frac{-4 \pm \sqrt{36}}{2} = \frac{-4 \pm 6}{2}$

$x = \frac{-4+6}{2}$ $\quad x = \frac{-4-6}{2}$

$\boxed{x = 1}$ $\quad \boxed{x = -5}$

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(23) $y^2 + 12y + 36 = 0$

$a=1 \quad b=12 \quad c=36$

$$x = \frac{-12 \pm \sqrt{(12)^2 - 4(1)(36)}}{2}$$

$$x = \frac{-12 \pm \sqrt{144-144}}{2}$$

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

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(24) $x^2 + 9 = -6x$

$x^2 + 6x + 9 = 0$

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

$$x = \frac{-6 \pm \sqrt{36-36}}{2}$$

$$\boxed{x = \frac{-6}{2} = -3}$$

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(25) $\frac{1}{4}t^2 - \frac{1}{3}t + \frac{5}{12} = 0$

multiply by LCD

$12\left(\frac{1}{4}t^2 - \frac{1}{3}t + \frac{5}{12}\right) = 0 \cdot 12$

$3t^2 - 4t + 5 = 0$

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

$$x = \frac{4 \pm \sqrt{16-60}}{6}$$

not a real number

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(26) $\sqrt{-100} = \sqrt{(-1)(100)}$

$= \sqrt{-1}\sqrt{100}$

$= i\,10 = \boxed{10i}$

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(27) $\sqrt{-72} = \sqrt{-1 \cdot 9 \cdot 8}$

$= \sqrt{-1 \cdot 36 \cdot 2}$

$= \boxed{6i\sqrt{2}}$

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(28) $\sqrt{-128} = \sqrt{-64 \cdot 2}$

$= \boxed{8i\sqrt{2}}$

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(29) ~~$(2+7i)(4$~~

$(2+7i) + (4+9i)$

$= (2+4) + (7i+9i)$

$= \boxed{6 + 16i}$

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(30) $(-11-5i) + (-7+12i)$

$= (-11-7) + (-5+12i)$

$= \boxed{-18 + 7i}$

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(31) $2i(5-i)$

$= 2i(5) + (2i)(-i)$

$= 10i - 2i^2$

$= 10i - 2(-1)$

$= 10i + 2$

$= \boxed{2 + 10i}$ ← Standard form

Worksheet 9 Solutions

32. $(2+7i)(2-7i) = 4 - 14i + 14i - 49i^2$
$= 4 - 49(-1)$
$= 4 + 49 = \boxed{53}$

33. $(5-3i)(2+i) = (5)(2) + (5i) + (-3i)(2) + (-3i)(i)$
$= 10 + 5i - 6i - 3i^2$
$= 10 - i - 3(-1)$
$= 10 - i + 3 = \boxed{13 - i}$

34. $\frac{3}{2+i} \cdot \frac{2-i}{2-i} = \frac{3(2-i)}{4 - i^2} = \frac{6-3i}{4+1} = \boxed{\frac{6-3i}{5}}$

35. $\frac{2+3i}{2+5i} \cdot \frac{2-5i}{2-5i} = \frac{(2+3i)(2-5i)}{4 + (-25)i^2}$
$= \frac{4 - 10i + 6i - 15i^2}{4 + 25}$
$= \frac{4 + 15 - 4i}{29} = \boxed{\frac{19-4i}{29}}$

36. $(t+4)^2 = -1$
$t + 4 = \pm\sqrt{-1}$
$t + 4 = \pm i$
$\boxed{t = -4 \pm i}$

37. $(2x-5)^2 = -8$
$2x - 5 = \pm\sqrt{-8}$
$2x - 5 = \pm 2i\sqrt{2}$
$2x = 5 \pm 2i\sqrt{2}$
$\boxed{x = \frac{5}{2} \pm i\sqrt{2}}$

38. $k^2 - 2k + 2 = 0$
Complete the square
$k^2 - 2k = -2$
$k^2 - 2k + 1 = -2 + 1$
$(k-1)^2 = -1$
$k - 1 = \pm\sqrt{-1} = \pm i$
$k - 1 = \pm i$
$\boxed{k = 1 \pm i}$

Worksheet 9 Solutions

39. $y = x^2 + 2$

$a=1 \quad b=0 \quad c=2$

Find vertex: $x = \frac{-0}{2(1)} = 0$

$y = (0)^2 + 2 = 2$

$(0,2)$ is vertex

Find y-int: $x=0$

$y = 0^2 + 2 = 2$ $\quad \boxed{(0,2)}$

Find x-int: $y=0$

$0 = x^2 + 2$

$x^2 = -2$

$x = \pm\sqrt{-2}$ not a real number

Find additional points:

$x = 2$

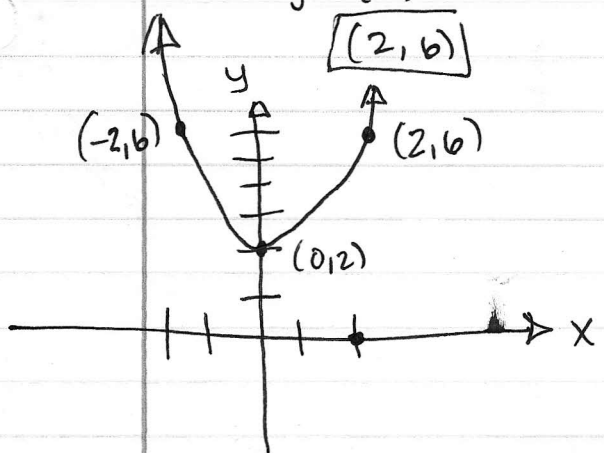
$y = (2)^2 + 2 = 6$

$\boxed{(2,6)}$

$x = -2$

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

$y = 6 \rightarrow \boxed{(-2,6)}$



40. $y = (x-2)^2 = x^2 - 2x + 4$

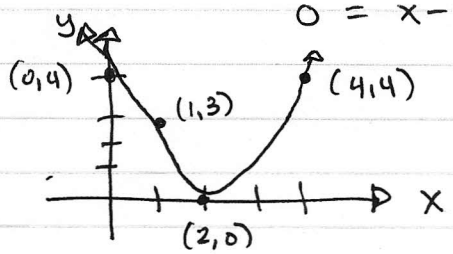
Vertex: $x = \frac{2}{2(1)} = 1$ $\boxed{(1,3)}$

$y = (1)^2 - 2(1) + 4 = 3$

y-int: $x=0 \rightarrow y = 0^2 - 2(0) + 4 = 4$ $\boxed{(0,4)}$

x-int: $y=0 \rightarrow 0 = (x-2)^2$

$0 = x - 2 \rightarrow x = 2$ $\boxed{(2,0)}$



additional point $x = 4$

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

$\boxed{(4,4)}$

41. $y = x^2 - 6x + 11$

Vertex: $\frac{6}{2} = 3 = x$ $y = (3)^2 - 6(3) + 11 = 2$ $\boxed{(3,2)}$

y-int: $x=0 \rightarrow y = 0^2 - 6(0) + 11$

$= 11$ $\boxed{(0,11)}$

x-int: $y=0$ $0 = x^2 - 6x + 11$

not factorable so plug into Quad. formula

$x = \frac{6 \pm \sqrt{36 - 4(11)}}{2} = \frac{6 \pm \sqrt{-8}}{2}$ not a real number

Find additional points

$x = 1$

$y = 1^2 - 6 + 11$

$y = 6$

$\boxed{(1,6)}$

$x = 4$

$y = 16 - 24 + 11$

$y = 3$

$\boxed{(4,3)}$