

WRH 4 Solutions

1.8: 20, 26, 39, 43, 53, 61, 84

1.9: 1, 6, 13, 17, 28, 42, 52, 63

2.1: 1, 10, 27, 41, 50

2.2: 3, 6, 32, 51

1.8

20.

$$3x^2 - 4 = -x$$

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

$$D = 1 + 4 \cdot 4 \cdot 3 = 49$$

$$x_1 = \frac{-1 + \sqrt{49}}{6}$$

$$x_2 = \frac{-1 - \sqrt{49}}{6}$$

$$x_1 = 1 \quad x_2 = -\frac{4}{3}$$

26.

$$2x^2 - x + 5 = 0$$

$$D = 1 - 4 \cdot 5 \cdot 2 = -39$$

$$D < 0$$

Therefore, we have two complex conjugate solutions.

39.

$$7x^2 - 42x = 0$$

$$x(7x - 42) = 0$$

Factoring

$$x = 0 \quad \text{or} \quad x = 6$$

43.

$$|x^2 - x| = 2$$

$$x^2 - x = 2$$

or

$$x^2 - x = -2$$

$$x^2 - x - 2 = 0$$

or

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

$$D = 1 + 8 = 9$$

$$x_1 = \frac{1+3}{2} = 2$$

$$x_2 = \frac{1-3}{2} = -1$$

$$D = 1 - 8 = -7$$

Two complex conjugate solutions

$$x_3 = \frac{1 + i\sqrt{7}}{2}$$

$$x_4 = \frac{1 - i\sqrt{7}}{2}$$

53.

$$(y^2 - 5)^2 + 5(y^2 - 5) - 36 = 0$$

$$y^2 - 5 = t$$

$$t^2 + 5t - 36 = 0$$

$$(t + 9)(t - 4) = 0$$

$$t = -9 \text{ or } t = 4$$

$$y^2 - 5 = -9 \quad \text{or} \quad y^2 - 5 = 4$$

$$y^2 = -4$$

$$y_{1,2} = \pm 2i$$

$$y^2 = 9$$

$$y_{3,4} = \pm 3$$

61.

$$x^4 + 5x^2 - 36 = 0$$

$$x^2 = t$$

$$t^2 + 5t - 36 = 0$$

$$(t+9)(t-4) = 0 \quad \sim \quad (x^2+9)(x^2-4) = 0$$

$$t = -9 \text{ or } t = 4$$

$$x^2 = -9 \text{ or } x^2 = 4$$

$$x_{1,2} = \pm 3i$$

$$x_{3,4} = \pm 2$$

84.

$$(y+3)^{2/5} + 4(y+3)^{1/5} = 0$$

$$(y+3)^{2/5} (1 + 4 \cdot (y+3)^{-1/5}) = 0$$

$$(y+3)^{2/5} = 0 \quad \text{or} \quad 1 + 4y + 12 = 0$$

$$y = -3$$

or

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

1.9

$$1. \quad \frac{2x^3 + 4x^2}{x^2 - 4x - 12} = \frac{-7x - 6}{x - 6}$$

$$\frac{2x^3 + 4x^2 - (x+2)(-7x-6)}{(x-6)(x+2)} = 0$$

$$x \neq 6 \quad \text{and} \quad x \neq -2$$

$$2x^3 + 4x^2 - (x+2)(-7x-6) = 0$$

$$2x^2(x+2) - (x+2)(-7x-6) = 0$$

$$(x+2)(2x^2 + 7x + 6) = 0$$

$$\cancel{x = -2}$$

$$2x^2 + 7x + 6 = 0$$

$$\Delta = 49 - 48 = 1$$

$$x_1 = \frac{-7+1}{4} = -\frac{3}{2}$$

$$x_2 = \frac{-7-1}{4} = -2$$

$$6. \quad \frac{z}{6+z} + \frac{z-1}{6-z} = \frac{z}{6-z}$$

$$\frac{z(6-z) + (z-1)(6+z) - z(6+z)}{(6+z)(6-z)} = 0$$

$$z \neq 6, \quad z \neq -6$$

$$6z - \cancel{z^2} + \cancel{6z} + \cancel{z^2} - 6 - z - \cancel{6z} - z^2 = 0$$

$$5z - z^2 - 6 = 0$$

$$z^2 - 5z + 6 = 0$$

$$(z-3)(z-2) = 0$$

$$z = 3$$

$$\text{or } z = 2$$

13.

$$\frac{1}{|x-3|} = 2$$

$$\frac{1}{x-3} = 2 \quad \text{or} \quad \frac{1}{x-3} = -2$$

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

$$x = \frac{7}{2}$$

or

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

$$x = \frac{5}{2}$$

17.

$$\sqrt{4-x} - x = 2$$

$$\sqrt{4-x} = 2+x$$

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

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

$$x^2 + 5x = 0$$

$$x(x+5) = 0$$

$$x = 0$$

$$\text{or } x = -5$$

$$4-x \geq 0$$

$$-x \geq -4$$

$$x \leq 4$$

$$\sqrt{9} + 5 \neq 2$$

28.

$$\sqrt{5x+5} = \sqrt{4x-7} + 2$$

$$5x+5 \geq 0$$

$$5x+5 = (\sqrt{4x-7} + 2)^2$$

and

$$4x-7 \geq 0$$

$$5x+5 = 4x-7 + 4\sqrt{4x-7} + 4$$

$$x+8 = 4\sqrt{4x-7}$$

$$(x+8)^2 = 16(4x-7)$$

$$x^2 + 16x + 64 = 64x - 112$$

$$x^2 - 48x + 176 = 0$$

$$\Delta = 2304 - 704$$

$$x_1 = \frac{48 - 40}{2} = 4$$

$$x_2 = \frac{48 + 40}{2} = 44$$

42. $(3x-5)^{1/5} = (x+1)^{1/5}$

$$3x-5 = x+1$$

$$2x = 6$$

$$x = 3$$

52.

$$E = mc^2$$

$$c = ?$$

$$c^2 = \frac{E}{m}$$

$$m \neq 0$$

$$c = \pm \sqrt{\frac{E}{m}}$$

63.

$$P = \frac{2\pi}{\sqrt{\frac{a^3}{\mu}}}$$

$$a = ?$$

$$\sqrt{\frac{u}{a^3}} \cdot p = 2\pi$$

$$\sqrt{\frac{u}{a^3}} = \frac{2\pi}{p}$$

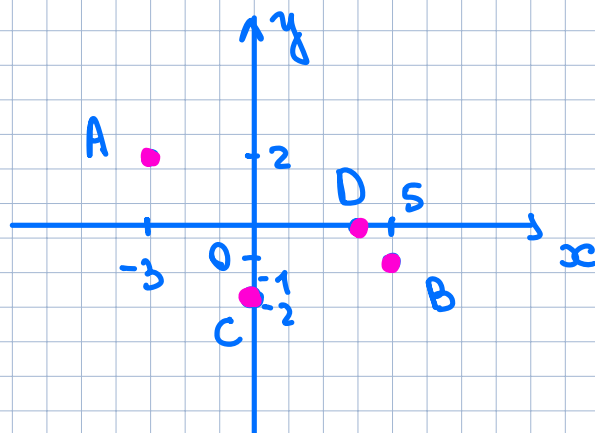
$$\frac{u}{a^3} = \frac{4\pi^2}{p^2}$$

$$a^3 = \frac{u \cdot p^2}{4\pi^2}$$

$$a = \sqrt[3]{\frac{u \cdot p^2}{4\pi^2}}$$

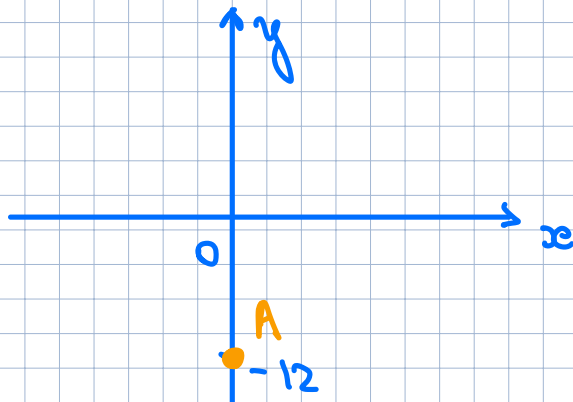
2.1

1.



$$\begin{aligned} A &= (-3, 2) \\ B &= (5, -1) \\ C &= (0, -2) \\ D &= (3, 0) \end{aligned}$$

10.



The point $A(0, -12)$ lies on y -axis (negative part).

27.

$$6x - 4y = 12$$

x	y
0	-3
2	0
3	$\frac{3}{2}$
4	3

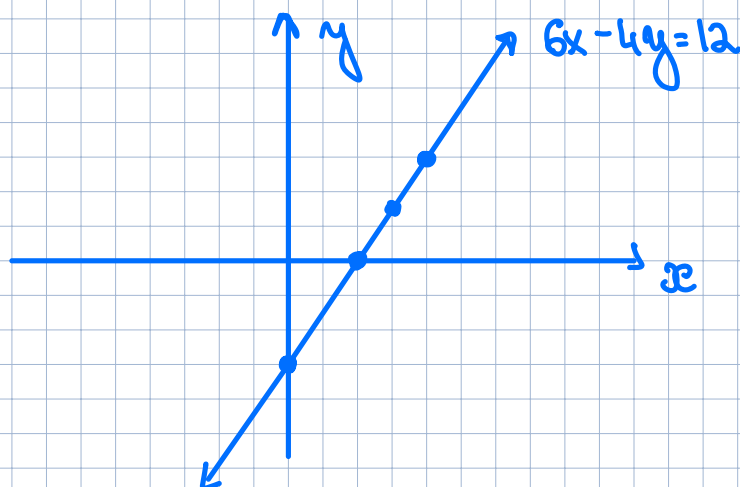
$$-4y = 12$$

$$6x = 12$$

$$18 - 4y = 12 \Rightarrow -4y = -6$$

$$6x - 12 = 12 \Rightarrow 6x = 24$$

$$\{(0, -3), (2, 0), (3, \frac{3}{2}), (4, 3)\}$$



41. (x_1, y_1) and (x_2, y_2)
 $(-3, -3)$ and $(5, -9)$

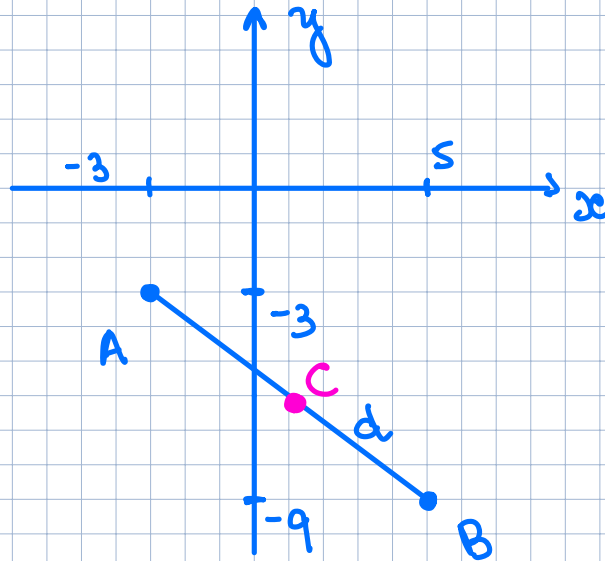
(a)

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$d = \sqrt{(5 + 3)^2 + (-9 + 3)^2}$$

$$d = \sqrt{64 + 36} = 10$$

(b)



$$C\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

$$C\left(\frac{5-3}{2}, \frac{-3-9}{2}\right) = (1, -6)$$



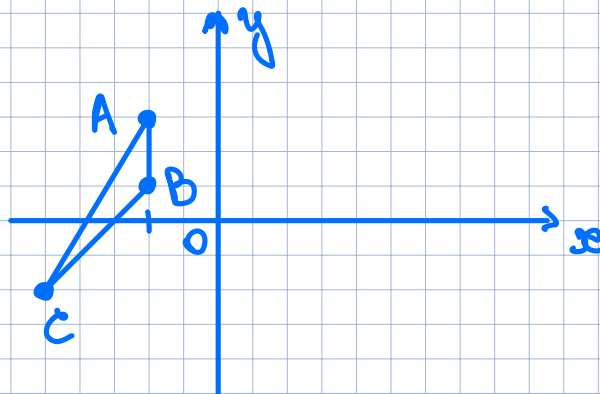
midpoint

50.

$$A(-2, 3)$$

$$B(-2, 1)$$

$$C(-5, -2)$$



$$AB = 2 \text{ (cm)}$$

$$BC = \sqrt{(-5+2)^2 + (-2-1)^2} = \sqrt{9+9} = 3\sqrt{2} \text{ (cm)}$$

$$AC = \sqrt{(-5+2)^2 + (-2-3)^2} = \sqrt{9+25} = \sqrt{34} \text{ (cm)}$$

$$P_{\triangle ABC} = 8 + 3\sqrt{2} + \sqrt{34} \text{ (cm)}$$

2.2

3. center $(7, -9)$

$$r = 3$$

$$(x-a)^2 + (y-b)^2 = r^2$$

$$(x-7)^2 + (y+9)^2 = 3^2 = 9$$

6. center $(6, 3)$

$$r = 8$$

$$(x-a)^2 + (y-b)^2 = r^2$$

$$(x-6)^2 + (y-3)^2 = 8^2 = 64$$

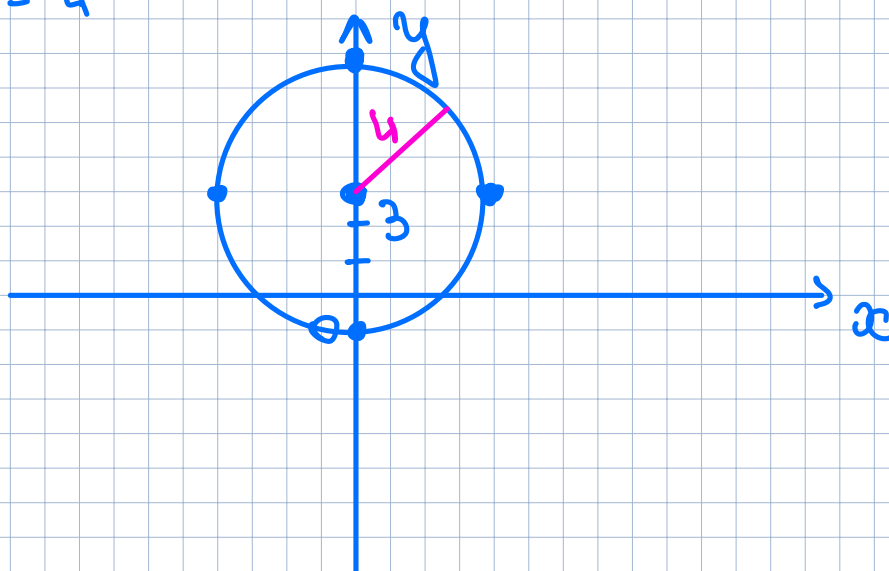
32.

$$x^2 + (y-3)^2 = 16$$

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

center $(0, 3)$

$$r = 4$$



51.

$$(x-1)^2 + y^2 = 9 = 3^2$$

center $(1, 0)$

$$r = 3$$

