

$$\textcircled{1} \quad \overline{AB} = \sqrt{[9 - (-1)]^2 + (2 - 6)^2} = \sqrt{100 + 16} = 2\sqrt{29}$$

$$\textcircled{2} \quad \text{midpt} = \left(\frac{-1 + 9}{2}, \frac{6 + 2}{2} \right) = \left(\frac{8}{2}, \frac{8}{2} \right) = (4, 4)$$

$$\textcircled{3} \quad m_{AB} = \frac{2 - 6}{9 - 1} = \frac{-2}{8} = -\frac{2}{8} \quad \text{Point B}(9, 2)$$

Point slope formula: $y - 2 = -\frac{2}{8}(x - 9)$

Clear fractions ($\times 8$) $8y - 16 = -2x + 18$

$$2x + 8y = 34$$

$$\textcircled{4} \quad \text{Midpt} \left(\frac{6 + (-2)}{2}, \frac{4 + 12}{2} \right) = \left(\frac{4}{2}, \frac{16}{2} \right) = (2, 8)$$

$$m = \frac{12 - 4}{-2 - 6} = \frac{8}{-8} = -1$$

$$m_{\perp} = 1$$

Pt slope formula $m = 1$; point $(2, 8)$

$$y - 8 = 1(x - 2) \rightarrow y - 8 = x - 2$$

$$x - y = -6$$

$$\textcircled{5} \quad A(1, 5); B(-7, 10)$$

$$m_{AB} = \frac{10 - 5}{-7 - 1} = \frac{5}{-8} = -\frac{5}{8}$$

$$m_{\parallel} = -\frac{5}{8} \quad \text{point}(-3, 9)$$

Pt slope: $y - 9 = -\frac{5}{8}(x - (-3)) \rightarrow y - 9 = -\frac{5}{8}(x + 3)$

Clear fractions $8y - 72 = -5x - 15$

$$8y = -5x + 57$$

$$y = -\frac{5}{8}x + \frac{57}{8}$$

$$6 \quad x_{int} = -5 ; y_{int} = 6$$

$$\text{Formula } \frac{6x}{6-5} + \frac{y5}{65} = \frac{30}{30}$$

$$\text{Clear fractions } -6x + 5y = 30$$

$$\text{or } 6x - 5y = -30$$

or:

$$x_{int} = -5 \quad (-5, 0) ; b = 6 \quad (0, 6)$$

$$m = \frac{6-0}{0-(-5)} = \frac{6}{5}$$

$$y = mx + b \rightarrow y = \frac{6}{5}x + 6$$

$$\text{clear fractions } 5y = 6x + 30$$

$$6x - 5y = -30$$

$$⑦ \quad y = 9x^2 + 30x + 25$$

$$a = 9 ; b = 30 ; c = 25$$

$$\text{AOS: } x = \frac{-b}{2a} = \frac{-30}{2(9)} = \frac{-5}{3}$$

Plug it in

$$y = 9\left(-\frac{5}{3}\right)^2 + 30\left(-\frac{5}{3}\right) + 25$$

$$= \frac{-225}{9} - \frac{150}{3} + 25 = 0$$

$$\text{Vertex } \left(-\frac{5}{3}, 0\right)$$

$$⑧ \quad y = 4x^2 - 16x + 16$$

$$a = 4 ; b = -16 ; c = 16$$

$$\text{AOS: } x = \frac{-b}{2a} = \frac{-(-16)}{2(4)} = \frac{16}{8} = 2$$

$$x = 2$$

9 i^{211}

$$\begin{array}{r}
 52 \\
 4 \overline{) 211} \\
 \underline{20} \\
 11 \\
 \underline{8} \\
 3
 \end{array}$$

R = 3

$$\begin{aligned}
 i^1 &= i \\
 i^2 &= -1 \\
 i^3 &= -i \\
 i^4 &= 1
 \end{aligned}$$

Final answer: $i^{211} = i^3 = -i$

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$$\begin{aligned}
 i^{-71} &= \frac{1}{i^{71}} \cdot \frac{i}{i} \\
 &= \frac{i}{i^{72}} \\
 &= \frac{i}{1} = i
 \end{aligned}$$

You want the denominator to be a multiple of 4 $\rightarrow 72$
 $72 \div 4 \rightarrow \text{remainder} = 0$
 $\rightarrow i^{72} = i^4 = 1$

$$\begin{aligned}
 (11) \quad (5+3i)^2 &= (5+3i)(5+3i) \\
 &= 25 + 15i + 15i + 9i^2 \\
 &= 25 + 30i + 9(-1) \\
 &= 16 + 30i
 \end{aligned}$$

$$\begin{aligned}
 (12) \quad \frac{3+4i}{2-5i} \cdot \frac{2+5i}{2+5i} &= \frac{6+15i+8i+20i^2}{4+10i-10i-25i^2} \\
 &= \frac{6+23i+20(-1)}{4-25(-1)} = \frac{-14+23i}{29} \\
 &= -\frac{14}{29} + \frac{23}{29}i
 \end{aligned}$$

$$\begin{aligned}
 (13) \quad 2x-5y=1 \quad (\text{times } 3) &\rightarrow 6x-15y=3 \\
 3x-4y=-2 \quad (\text{times } -2) &\rightarrow -6x+8y=4 \\
 \hline
 -7y &= 7 \rightarrow y = -1
 \end{aligned}$$

Plug in to 1st eq: $2x - 5(-1) = 1 \rightarrow 2x = -4 \rightarrow x = -2$
 $(-2, -1)$

14 $\sqrt{x^2+5} = x+3 \rightarrow$ square both sides

$$x^2+5 = (x+3)^2$$

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

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

plug it in to check

$$\sqrt{\left(-\frac{2}{3}\right)^2 + \frac{5}{\frac{1}{9}}} = -\frac{2}{3} + \frac{3}{\frac{1}{3}}$$

$$\sqrt{\frac{4}{9} + \frac{45}{9}} = -\frac{2}{3} + \frac{9}{3}$$

$$\sqrt{\frac{49}{9}} = \frac{7}{3}$$

$$\frac{7}{3} = \frac{7}{3} \quad \checkmark$$

15 $12x^2 - 3x - 36 = 0 \rightarrow$ divide both sides by 3

$$4x^2 - x - 12 = 0$$

$$x = \frac{1 \pm \sqrt{(-1)^2 - 4(4)(-12)}}{2(4)} = \frac{1 \pm \sqrt{193}}{2}$$

16 min value $f(6) = 2 \rightarrow$ vertex $(6, 2)$

vertex form: $y = a(x-6)^2 + 2$

Plug in $(1, 7) \rightarrow 7 = a(1-6)^2 + 2$

$$7 = 25a + 2$$

$$5 = 25a \rightarrow a = \frac{1}{5}$$

$$y = \frac{1}{5}(x-6)^2 + 2 \rightarrow f(x) = \frac{1}{5}(x-6)^2 + 2$$

17 $(2, 5) (7, 1) \rightarrow m = \frac{1-5}{7-2} = -\frac{4}{5}$

Pt slope $y-1 = -\frac{4}{5}(x-7)$

$$5y-5 = -4x+28 \rightarrow 5y = -4x+33$$

$$y = -\frac{4}{5}x + \frac{33}{5}$$

$$f(x) = -\frac{4}{5}x + \frac{33}{5}$$

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$$y = -2(x-3)^2 + 2 \rightarrow \text{Vertex}(3, 2)$$

$$\text{AOS: } x = 3$$

opens down

$$y \text{ int} \rightarrow x = 0$$

$$y = -2(0-3)^2 + 2 \rightarrow y = -16 \quad (0, -16)$$

$$x \text{ int} \rightarrow y = 0$$

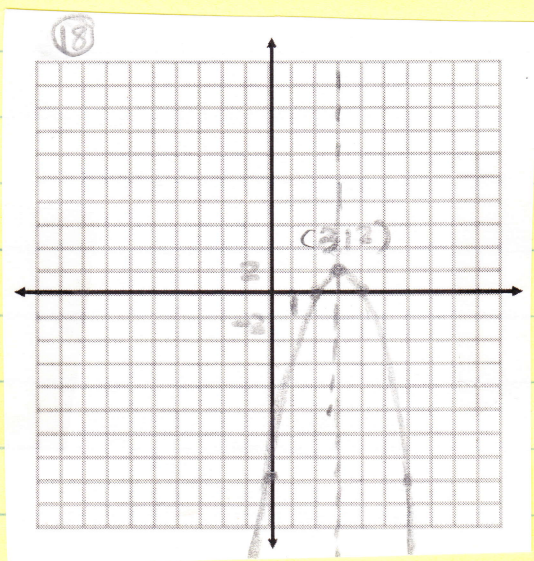
$$0 = -2(x-3)^2 + 2$$

$$-2 = -2(x-3)^2 \rightarrow 1 = (x-3)^2$$

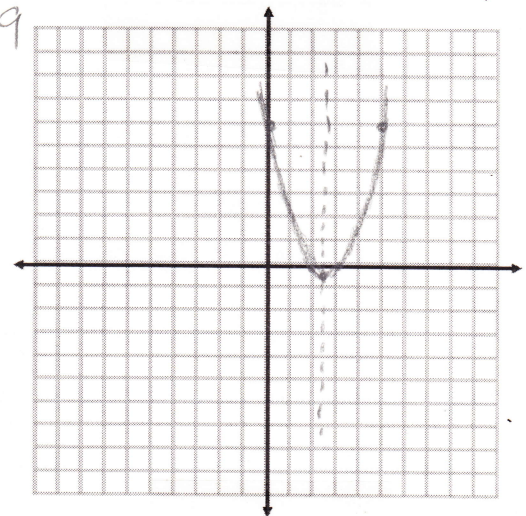
$$\text{take square root} \rightarrow x-3 = \pm 1$$

$$x = 3 \pm 1 \rightarrow x = 4 \quad (4, 0)$$

$$x = 2 \quad (2, 0)$$



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$$y = x^2 - 5x + 6 \rightarrow y = (x-2)(x-3)$$

$$x \text{ int} = (2, 0) \quad (3, 0)$$

$$y \text{ int} = 0^2 - 5(0) + 6 = 6 \rightarrow (0, 6)$$

$$\text{AOS: midpoint of } x \text{ int} \Rightarrow x = \frac{2+3}{2} = \frac{5}{2}$$

$$\text{Plugin } \frac{5}{2} \rightarrow y = \left(\frac{5}{2}\right)^2 - 5\left(\frac{5}{2}\right) + 6 =$$

$$\frac{25}{4} - \frac{25 \cdot 2}{2 \cdot 2} + \frac{6 \cdot 4}{1 \cdot 4} = -\frac{1}{4}$$

$$\text{Vertex} = \left(\frac{5}{2}, -\frac{1}{4}\right)$$

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$$x+y=2 \longrightarrow x+x^2+x-6=2$$

$$y=x^2+x-6$$

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

$$(x+4)(x-2)=0$$

$$x=-4 \quad x=2$$

$$y=(-4)^2+(-4)-6; \quad y=(2)^2+(2)-6$$

$$y=6$$

$$y=0$$

$$(-4, 6)$$

$$(2, 0)$$

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$$(1, 3) \quad (2, 5) \quad (3, 9)$$

$$3 = a(1)^2 + b(1) + c \longrightarrow 3 = a + b + c \quad (1)$$

$$5 = a(2)^2 + b(2) + c \longrightarrow 5 = 4a + 2b + c \quad (2)$$

$$9 = a(3)^2 + b(3) + c \longrightarrow 9 = 9a + 3b + c \quad (3)$$

$$(1) - (2)$$

$$(2) - (3)$$

$$(1) \quad 3 = a + b + c$$

$$(2) \quad 5 = 4a + 2b + c$$

$$(2) \text{ times } -1 \quad -5 = -4a - 2b - c$$

$$(3) (-1) \quad -9 = -9a - 3b - c$$

$$\underline{-2 = -3a - b} \quad (4)$$

$$\underline{-4 = -5a - b} \quad (5)$$

$$(5) \text{ times } -1 \longrightarrow 4 = 5a + b$$

$$(4) \quad \underline{-2 = -3a - b}$$

$$2 = 2a \longrightarrow a = 1$$

$$(4) \quad -2 = -3(1) - b$$

$$-b = 1 \longrightarrow b = -1$$

$$(1) \quad 3 = 1 + (-1) + c \longrightarrow c = 3$$

$$f(x) = 1x^2 - 1x + 3$$

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$$3x - 5y = 10$$

$$-5y = -3x + 10$$

$$y = \frac{3}{5}x - 2$$

