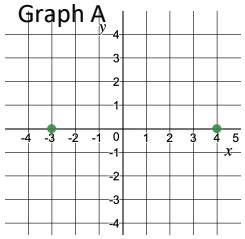
U2D11 MCR3UI Worksheet **Families of Quadratics**

Determine the maximum number of parabolas that could be drawn through the points given in each of the graphs to the right.

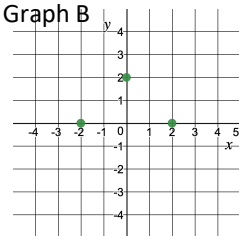
Number of Points:

Number of Possible Parabola:

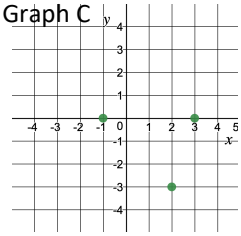
Graph A



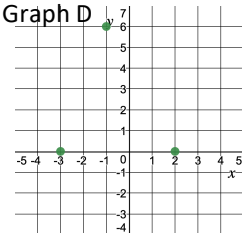
Graph B



Graph C



Graph D



What is the minimum number of points required to define a unique parabola?

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1. What characteristics will two parabolas in the family $f(x) = a(x-2)(x+5)$ share?
2. How are the parabolas $f(x) = -2(x-3)^2 - 5$ and $g(x) = 6(x-3)^2 - 5$ the same? How are they different?
3. What point do the parabolas $f(x) = 3x^2 + 5x - 9$ and $g(x) = -5x^2 + 5x - 9$ have in common?
4. Determine the equation of the parabola with x-intercepts
   a) -4 and 3, and that passes through (2, 7)
   b) 0 and 8, and that passes through (-3, -6)
   c) $\sqrt{7}\ and\ -\sqrt{7}$, and that passes through (-5, 3)
   d) $1-\sqrt{2}\ and\ 1+\sqrt{2}$, and that passes through (2, 4)
5. Determine the equation of the parabola with vertex
   a) (-2, 5) and that passes through (4, -8)
   b) (1, 6) and that passes through (0, -7)
   c) (4, -5) and that passes through (-1, -3)
   d) (4, 0) and that passes through (11, 8)
6. Determine the equation of the quadratic function $f(x) = ax^2 - 6x - 7$ if $f(2) = 3$
7. Determine the equation of the parabola with x-intercepts ± 4 and passing through (3, 6)
8. Determine the equation of the quadratic function that passes through (-4, 5) if its zeros are $2+\sqrt{3}$ and $2-\sqrt{3}$.
9. What is the equation of the parabola with zeros -1, -3 if the point (-4, -9) is on the graph?
10. a) Write the equation of the family of quadratic functions whose roots are 5 and -6.
    b) Determine the equation of the *specific member* of the above family that passes through the point (1, -3)
11. Write one possible quadratic equation, given each pair of roots:

a) $7 \text{ and } -2$ b) $-\frac{3}{5}\ and\ -\frac{2}{3}$ c) $2-\sqrt{5}\ and\ 2+\sqrt{5}$ d) $\frac{3+2\sqrt{6}}{2}\ and\ \frac{3-2\sqrt{6}}{2}$

12. Determine the standard form equation of the quadratic function that has an optimal value of -12, if the roots of the corresponding quadratic equation are $3+2\sqrt{3}\ and\ 3-2\sqrt{3}$.
13. Determine the standard form equation of the quadratic function that goes through $(-4,-1)$, if the only root of the corresponding quadratic equation is $-\frac{7}{2}$.
14. Determine the standard form equation of the quadratic function that represents the family of parabolas, if the roots of the corresponding quadratic equation are $-\frac{\sqrt{5}}{2}\ \ and\ \ \frac{\sqrt{5}}{2}$.

Answers:

1. Same zeros, Same Axis of Symmetry 2. Same vertex, same A of S, different direction of opening, different stretch
3. $f(x), g(x)$ have the same y-intercept at -9

4. a) $y = \frac{-7}{6}(x+4)(x-3)$ 4. b) $y = \frac{-2}{11}(x)(x-8)$ 4. c) $y = \frac{-1}{6}(x^2-7)$ 4. d) $y = -4x^2+8x+4$

5. a) $y = \frac{-13}{36}(x+2)^2+5$ 5.b) $y = -13(x-1)^2+6$ 5.c) $y = \frac{2}{25}(x-4)^2-5$ 5. d) $y = \frac{8}{49}(x-4)^2$

6. $y = \frac{11}{2}x^2-6x-7$ 7. $y = \frac{-6}{7}(x^2-16)$ 8. $y = \frac{5}{33}(x^2-4x+1)$ 9. $y = -3x^2-12x-9$

10. a) $y = k(x-5)(x+6)$ 10. b) $y = \frac{3}{28}(x-5)(x+6)$

11. a) $x^2-5x-14=0$ 11. b) $15x^2+19x+6=0$ 11. c) $x^2-4x-1=0$ 11. d) $4x^2-12x-15=0$

12. $f(x) = x^2-6x-3$ 13. $f(x) = -4x^2-28x-49$ 14. $f(x) = 4kx^2-5k,\ k \in \mathbb{R}$