:

Student Activity 3a

Tables for each of the functions below are drawn on the next page of this document for $x \in \{-2, -1, 0, 1, 2, 3, 4, 5, 6\}$.
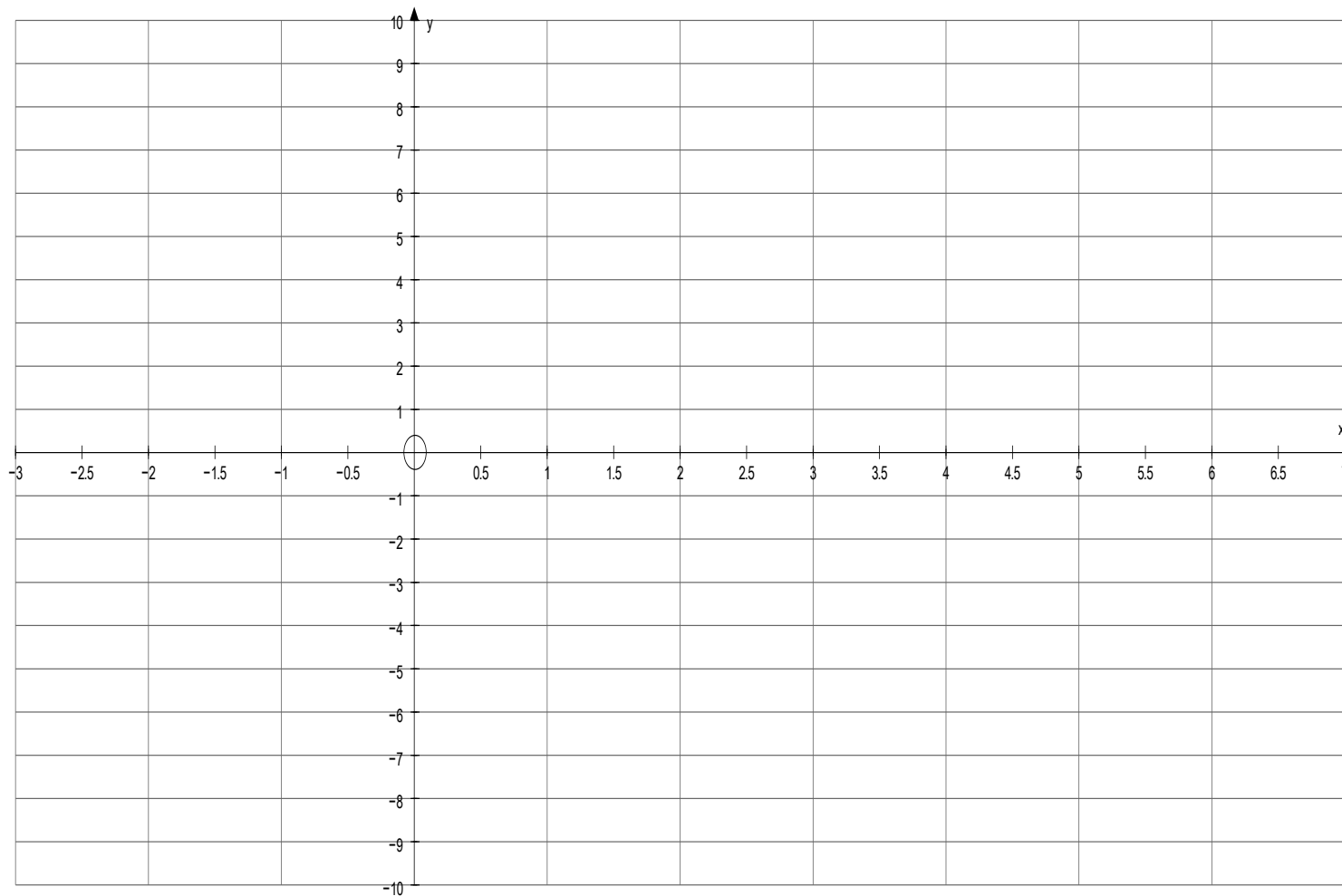
What do you notice about all the tables?

Using the same axes and scales plot the points for each function and join up the points to form an appropriate curve.

Polynomial in the form $f(x) = ax^2 + bx + c$ $f(x) = (x+r)(x+s)$ $f(x) = (x+h)^2 + k$	State the shape of the graph and whether it opens upwards or downwards	$x-$ intercepts (algebraic method and using the graph)	$y-$ intercept (algebraic method and using the graph)	Maximum/ minimum point as an ordered pair and labelled as max or min	Real root(s) of $f(x) = 0$	Equation of the axis of symmetry	$f(2.7)$	Solve $f(x) = 8$	For what x values is f(x) positive? $f(x) > 0$	For what x values is f(x) negative? $f(x) < 0$	For what x values is f(x) increasing?	For what x values is f(x) decreasing?
$y = x^2 - 4x - 5$												
$y = (x-5)(x+1)$												
$y = (x-2)^2 - 9$												

1. What do you notice about all of the graphs and all of the three functions you have plotted in this activity?

2. What items of information about the graph can you read from the equation $y = x^2 - 4x - 5$ before you plot its graph?

3. What extra items of information can you tell about the graph in this factored form $y = (x-5)(x+1)$?

4. What are the roots of $y = (x-5)(x+1)$?

5. What are the roots of $y = (x+r)(x+s)$?

6. What extra item of information can you tell about the graph when f(x) is in the form $y = (x-2)^2 - 9$?

7. How does knowing the x- intercepts (roots) help us to find the axis of symmetry?

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Plot the points and draw the graph for each of the functions in the tables on this page.
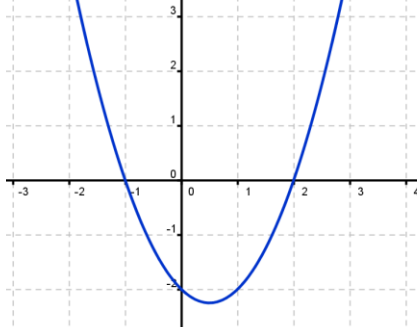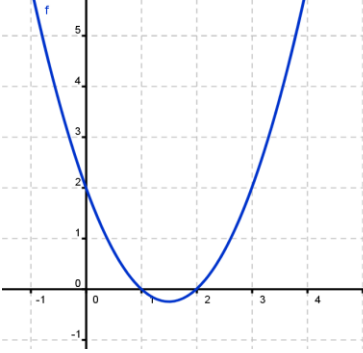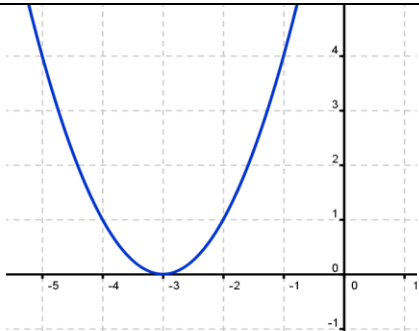
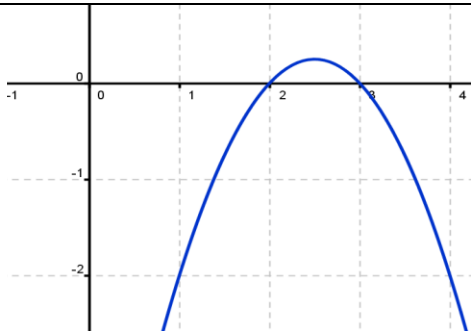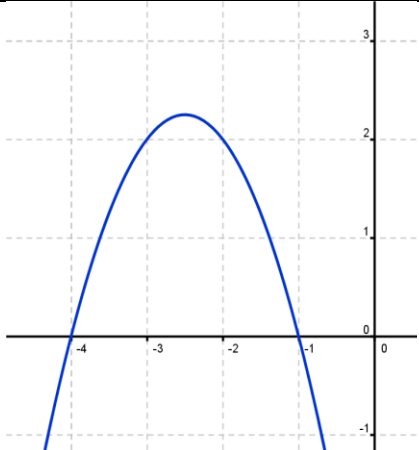| x	$y = x^2 - 4x - 5$	(x, y)

x	$y = (x-5)(x+1)$	(x, y)

x	$y = (x-2)^2 - 9$	(x, y)

Write the equation for each graph below in factored form i.e. $y = (x+r)(x+s)$ and also in the general form $y = ax^2 + bx + c$.

1. How are the roots linked to the factored form? Explain your answer.

2. How is the y - intercept linked to the general form? Explain your answer.

|	
1.	2.
3.	4.
5.	Draw x and y axis and draw the graph of a quadratic function below giving its equation in the form $y = (x+r)(x+s)$.

Student Activity 3a

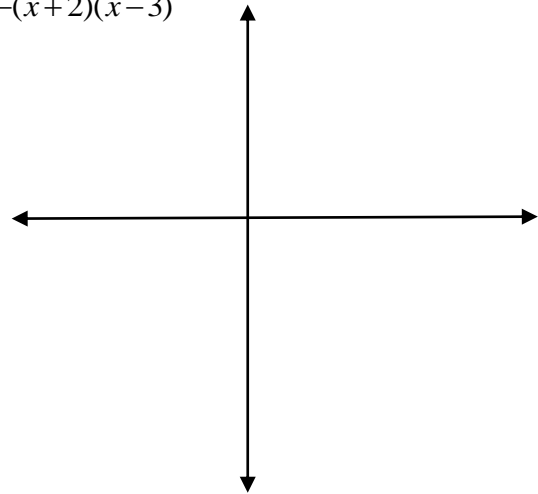Working in pairs, **sketch** the following graphs on the axes below.
Note particularly the intercepts on the axes and whether the graph has a local maximum or local minimum. (Check the sign of y values for x values between the roots.)

Verify that you are correct by using a graphing calculator or graphing software such as GeoGebra if you have access to these. Alternatively use the "Table" mode on your calculator to verify points.
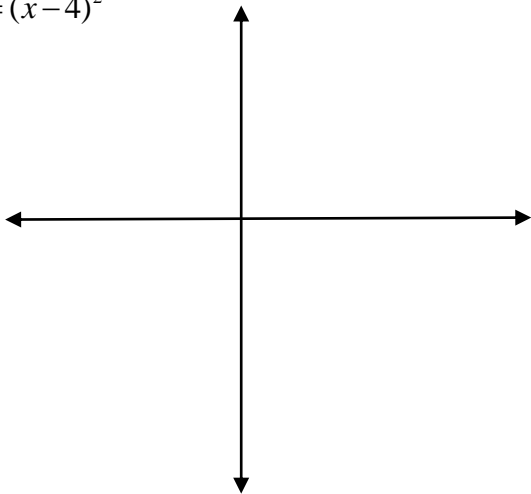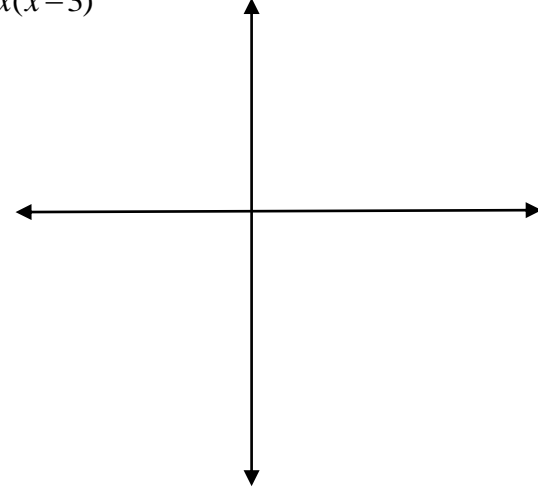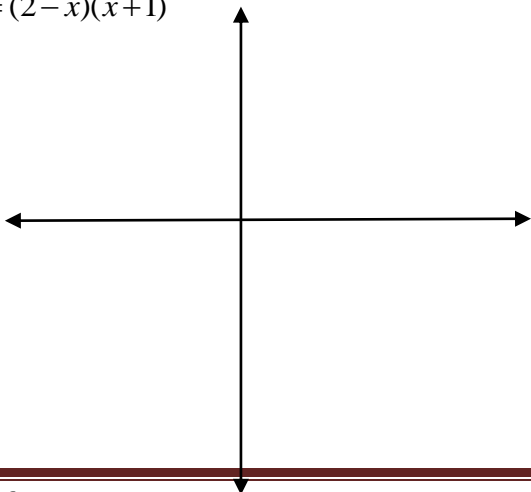
$y = (x+2)(x-3)$
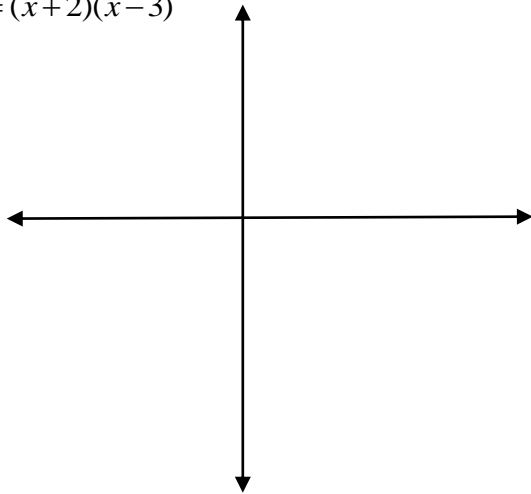
$y = -(x+2)(x-3)$

$y = (x-4)^2$

$y = x(x-3)$

$y = (2-x)(x+1)$

Add your own!