## Unit 2 Lesson 11: Finding Intersections

### 1 Math Talk: When $f$ Meets $g$ (Warm up)

#### Student Task Statement

Mentally identify a point where the graphs of the two functions intersect, if one exists.

$f\left(x\right)=x$ and $g\left(x\right)=3$

$j\left(x\right)=\left(x+3\right)\left(x−3\right)$ and $k\left(x\right)=0$

$m\left(x\right)=\left(x+3\right)\left(x−3\right)$ and $n\left(x\right)=\left(x−3\right)$

$p\left(x\right)=\left(x+5\right)\left(x−5\right)$ and $q\left(x\right)=\left(x+3\right)\left(x−3\right)$

### 2 More Points of Intersection

#### Student Task Statement

For each pair of polynomials given, find all points of intersection of their graphs.

1. $c\left(x\right)=x^{2}−7$ and $d\left(x\right)=2$
2. $f\left(x\right)=\left(x+7\right)\left(x−4\right)$ and $g\left(x\right)=x−4$
3. $m\left(x\right)=\left(x+7\right)\left(x−4\right)$ and $n\left(x\right)=\left(2x+5\right)\left(x−4\right)$
4. $p\left(x\right)=\left(x+1\right)\left(x−8\right)$ and $q\left(x\right)=\left(x+2\right)\left(x−4\right)$

### 3 Graphing to Find Points of Intersection

#### Student Task Statement

Consider the functions $p\left(x\right)=5x^{3}+6x^{2}+4x$ and $q\left(x\right)=5640$.

1. Use graphing technology to find a value of $x$ that makes $p\left(x\right)=q\left(x\right)$ true.
2. For the $x$-value at the point of intersection, what can you say about the value of $5x^{3}+6x^{2}+4x−5640$?
3. What does your answer suggest is a possible factor of $5x^{3}+6x^{2}+4x−5640$?
	1. Write your own polynomial $m\left(x\right)$ of degree 3 or higher.
	2. Use graphing technology to estimate the values of $x$ that make $m\left(x\right)=q\left(x\right)$ true.



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