

# Polynomial and Rational Functions Scavenger Hunt

## Teacher Notes

In this scavenger hunt, students work through 11 problems in pairs or trios. Post the papers around the room, being sure to mix them up and NOT post them in the same order as they appear in the file.

Students can start at any station and the answer to the multiple choice question will dictate where they go next. For example, the correct answer to the card that says **D** at the top is answer "**R**." Therefore, students now go to the card that says **R** at the top and answer the next question. Students know they are finished when they get back to the paper where they started.

Students should keep track of their work on a scrap piece of paper and record the order in which they do the problems on the corresponding recording sheet. This will make it easy for you to check their work.

The correct order of stations should spell D-R-A-G-O-N-F-L-I-E-S. Since students can start at any station, their answer might start at a different letter and loop around (example: ONFLIESDRAG would be a correct solution).

Order of answers:

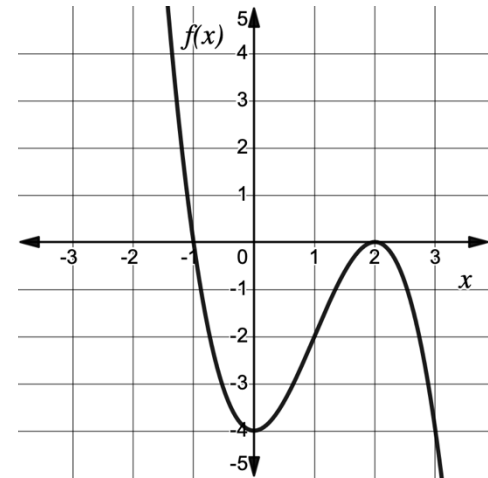
# DRAGONFLIES

(starting anywhere and "looping" around from S back to D)

(The answer to the **D** card is **R**, the answer to the **R** card is **A**, the answer to the **A** card is **G**, etc.)

# D

Which of the following equations represents the cubic polynomial shown?



If this is the answer  Go to <b>L</b>	$f(x) = (x + 2)(x - 1)^2$	If this is the answer  Go to <b>F</b>	$f(x) = -(x + 2)(x - 1)^2$
If this is the answer  Go to <b>R</b>	$f(x) = -(x + 1)(x - 2)^2$	If this is the answer  Go to <b>O</b>	$f(x) = (x + 1)(x - 2)^2$

# R

The function  $g$  is defined by a polynomial. Selected values of  $g$  are given in the table. Which of the following must be a factor of  $g(x)$ ?

$x$	$g(x)$
-2	10
0	9
3	0
4	-2

If this is  
the answer

Go to

**N**

$$x + 2$$

If this is  
the answer

Go to

**S**

$$x - 9$$

If this is  
the answer

Go to

**L**

$$x - 4$$

If this is  
the answer

Go to

**A**

$$x - 3$$

# A

Let  $f$  be a polynomial of degree 5. Which statement is guaranteed to be true?

<p>If this is the answer</p> <p>Go to <b>D</b></p> <p><math>f</math> has 5 real zeros</p>	<p>If this is the answer</p> <p>Go to <b>I</b></p> <p><math>f</math> has 3 real zeros and 2 imaginary zeros</p>
<p>If this is the answer</p> <p>Go to <b>G</b></p> <p><math>f</math> has at least one real zero</p>	<p>If this is the answer</p> <p>Go to <b>E</b></p> <p><math>f</math> has an even number of x-intercepts</p>

# G

A rational function  $g$  has  $x - 3$  as a factor of its numerator and denominator. Describe what is happening on the graph of  $g$  at  $x = 3$ .

If this is  
the answer

Go to

**O**

The graph of  $g$  has a  
hole at  $x = 3$ .

If this is  
the answer

Go to

**R**

The graph of  $g$  has an  
x-intercept at  $x = 3$ .

If this is  
the answer

Go to

**F**

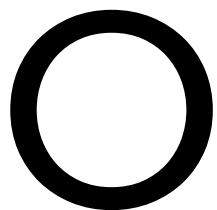
The graph of  $g$  has a  
vertical asymptote at  
 $x = 3$ .

If this is  
the answer

Go to

**L**

None of the above.

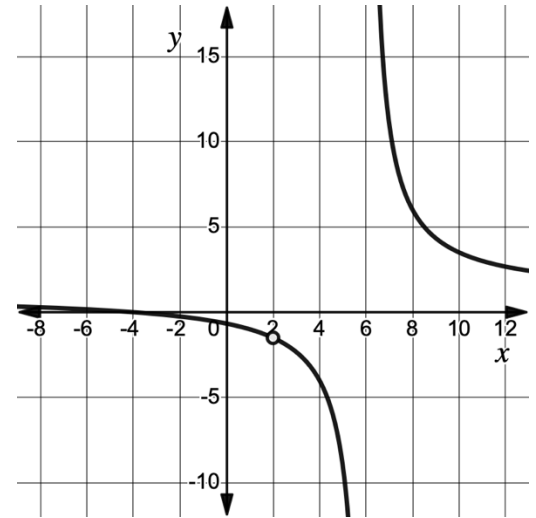


For some polynomial function  $p$ , it is known that  $\frac{p(x)}{x+6} = 3x^2 - 8x + 11 - \frac{12}{x+6}$ . Find  $p(-6)$ .

<p>If this is the answer</p> <p>Go to</p> <p><b>N</b></p> <p><math>p(-6) = -12</math></p>	<p>If this is the answer</p> <p>Go to</p> <p><b>A</b></p> <p><math>p(-6) = 0</math></p>
<p>If this is the answer</p> <p>Go to</p> <p><b>E</b></p> <p><math>p(-6) = 12</math></p>	<p>If this is the answer</p> <p>Go to</p> <p><b>R</b></p> <p><math>p(-6) = 23</math></p>

# N

The graph of a rational function  $y = f(x)$  is shown. Which of the following could be the equation for  $f(x)$ ?



If this is  
the answer

Go to

**I**

$$f(x) = \frac{(x + 4)(x - 6)}{(x - 6)(x - 2)}$$

If this is  
the answer

Go to

**G**

$$f(x) = \frac{(x - 2)(x - 6)}{(x - 2)(x + 4)}$$

If this is  
the answer

Go to

**S**

$$f(x) = \frac{(x + 2)(x - 4)}{(x + 2)(x + 6)}$$

If this is  
the answer

Go to

**F**

$$f(x) = \frac{(x + 4)(x - 2)}{(x - 2)(x - 6)}$$

# F

Let  $f(x) = (x - 4)^n$  for some positive integer  $n$ . When  $f(x)$  is written in standard form, the linear term is  $-256x$ . What is the value of  $n$ ?

If this is  
the answer

Go to

**D**

3

If this is  
the answer

Go to

**L**

4

If this is  
the answer

Go to

**E**

5

If this is  
the answer

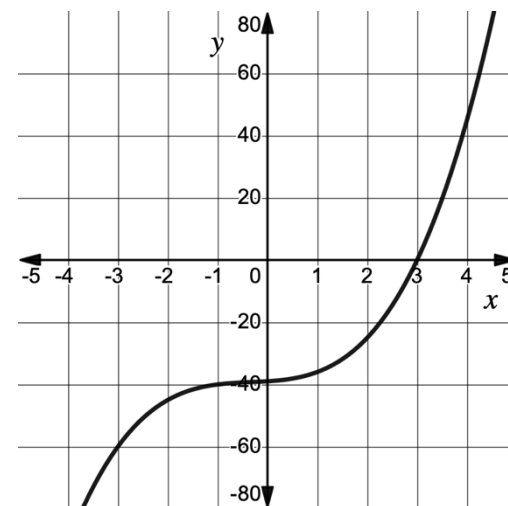
Go to

**O**

6

**L**

The graph of  $h(x) = x^3 + x^2 + x - 39$  is shown. Find all zeros of  $h$ .



If this is  
the answer

Go to

$$x = 3, x = -4 \pm 6i$$

**G**

If this is  
the answer

Go to

$$x = 3, x = -2 \pm 3i$$

**I**

If this is  
the answer

Go to

$$x = -3, x = 2 \pm 3i$$

**S**

If this is  
the answer

Go to

$$x = 3, x = -2 \pm \sqrt{18}i$$

**D**

A rational function,  $f$ , has a degree of  $n$  in the numerator and a degree of  $m$  in the denominator. For very large values of  $x$ , the graph of  $f$  approaches the line  $y = 3x - 5$ . Which of the following statements is true?

If this is the answer Go to <b>R</b>	$n - m = 3$	If this is the answer Go to <b>N</b>	$n = m$
If this is the answer Go to <b>E</b>	$n - m = 1$	If this is the answer Go to <b>A</b>	$n < m$

# E

The graph of  $k(x) = \frac{1}{6}(x - 3)^5$  has a y-intercept of...

<p>If this is the answer</p> <p>Go to</p> <p><b>S</b></p>	<p>If this is the answer</p> <p>Go to</p> <p><b>L</b></p>
<p>-40.5</p>	<p>2.5</p>
<p>If this is the answer</p> <p>Go to</p> <p><b>G</b></p>	<p>If this is the answer</p> <p>Go to</p> <p><b>P</b></p>
<p>-1/2</p>	<p>40.5</p>

# S

Let  $g(x) = \frac{-4x^2 + 5x^3 - 9x + kx^3 - 20}{7(x-2)^2(x+4)}$  for some constant  $k$ .

If  $\lim_{x \rightarrow \infty} g(x) = 3$ , find the value of  $k$ .

If this is  
the answer

Go to

**O**

21

If this is  
the answer

Go to

**N**

-2

If this is  
the answer

Go to

**L**

3

If this is  
the answer

Go to

**D**

16