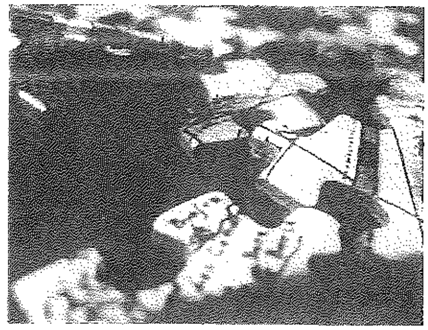
3.10 Puzzling Over Polynomials

A Practice Understanding Task



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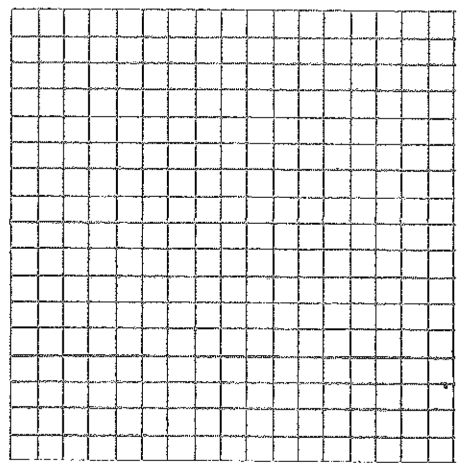
For each of the polynomial puzzles below, a few pieces of information have been given. Your job is to use those pieces of information to complete the puzzle. Occasionally, you may find a missing piece that you can fill in yourself. For instance, although some of the roots are given, you may decide that there are others that you can fill in.

1.	**Function (in factored form)** **Function (in standard form)** **End behavior:** *as* $x \to -\infty, \quad f(x) \to$ ____ *as* $x \to \infty, \quad f(x) \to$ ____ **Roots (with multiplicity):** -2, 1, and 1 **Value of leading co-efficient:** -2 **Degree:** 3	Graph: 

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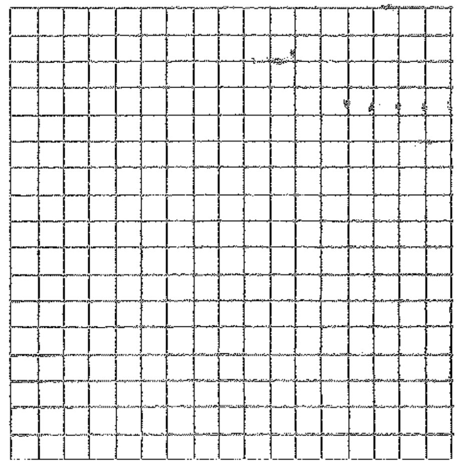
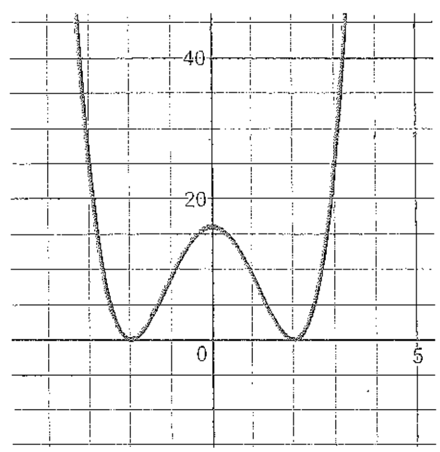
2.	**Function (in factored form)** **Function (in standard form)** **End behavior:** $as\ x \to -\infty, \quad f(x) \to$ ____ $as\ x \to \infty, \quad f(x) \to$ ____ **Roots (with multiplicity):** $2+i, 4, 0$ **Value of leading co-efficient:** 1 **Degree:** 4	Graph:

3.	**Function:** $f(x) = 2(x-1)(x+3)^2$ **End behavior:** $as\ x \to -\infty, \quad f(x) \to$ ____ $as\ x \to \infty, \quad f(x) \to$ ____ **Roots (with multiplicity):** Value of leading co-efficient: **Domain:** **Range:** All Real numbers	Graph:

4.	**Function:** **End behavior:** *as* $x \to -\infty$, $f(x) \to \infty$ *as* $x \to \infty$, $f(x) \to$ ____ **Roots (with multiplicity):** (3,0) m: 1; (-1,0) m: 2 (0,0) m: 2 **Value of leading co-efficient:** -1 **Domain:** **Range:**	Graph: 
5.	**Function:** **End behavior:** *as* $x \to -\infty$, $f(x) \to$ ____ *as* $x \to \infty$, $f(x) \to$ ____ **Roots (with multiplicity):** **Value of leading co-efficient:** 1 **Domain:** **Range:** **Other:** $f(0) = 16$	Graph: 

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6.

Function (in standard form):
$f(x) = x^3 - 2x^2 - 7x + 2$

Function (in factored form):

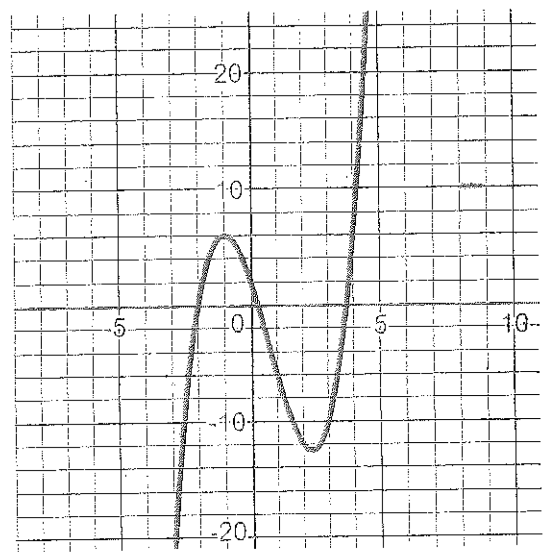
End behavior:
as $x \to -\infty$, $f(x) \to$ ____
as $x \to \infty$, $f(x) \to$ ____

Roots (with multiplicity):
-2

Domain:

Range:

Graph:



7.

Function (in standard form):
$f(x) = x^3 - 2x$

Function (in factored form):

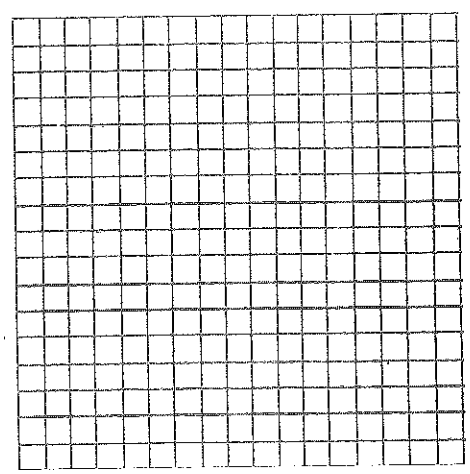
End behavior:
as $x \to -\infty$, $f(x) \to$ ____
as $x \to \infty$, $f(x) \to$ ____

Roots (with multiplicity):

Domain:

Range:

Graph:



READY, SET, GO! Name Period Date

READY

Topic: Reducing rational numbers and expressions

Reduce the expressions to lowest terms. (Assume no denominator equals 0.)

1. $\frac{3x}{6x^2}$

2. $\frac{2\cdot 5\cdot x\cdot x\cdot x\cdot y}{3\cdot 5\cdot x\cdot y\cdot y}$

3. $\frac{7ab^2}{7ab^2}$

4. $\frac{(x+2)(x-9)}{(x+2)(x-9)}$

5. $\frac{(3x-5)(x+4)}{(x-1)(3x-5)}$

6. $\frac{(2x-11)(3x+17)}{(2x-11)(3x-5)}$

7. $\frac{(8x-7)(x+3)}{8x(x+3)(2x-3)}$

8. $\frac{3x(2x+7)(x-1)(6x-5)}{x(2x+7)(x-1)(6x-5)}$

9. Why is it important that the instructions say to assume that no denominator equals 0?

SET

Topic: Reviewing features of polynomials

Some information has been given for each polynomial. Fill in the missing information.

10.

Function: $f(x) = x^3$

Function in factored form:

End behavior:

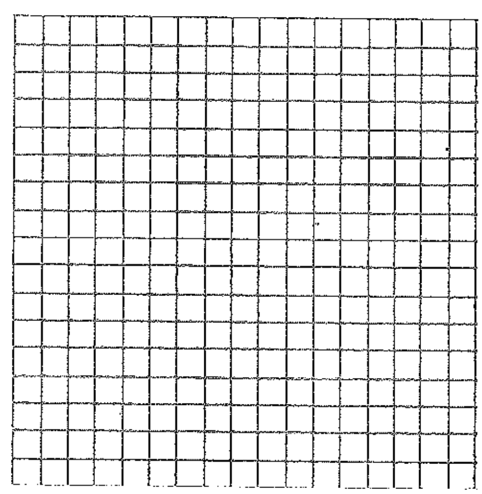
As $x \to -\infty, f(x) \to$ _____ As $x \to \infty, f(x) \to$ _____

Roots (with multiplicity):

Degree:

Value of leading co-efficient:

Graph:



11. **Graph:**

Function in standard form:

Function in factored form: $g(x) = -x(x-2)(x-4)$

End behavior:

As $x \to -\infty, g(x) \to$ _____ As $x \to \infty, g(x) \to$ _____

Roots (with multiplicity):

Degree:

Value of leading co-efficient:

12. **Graph:**

Function in standard form: $h(x) = x^3 - 2x^2 - 3x$

Function in factored form:

End behavior:

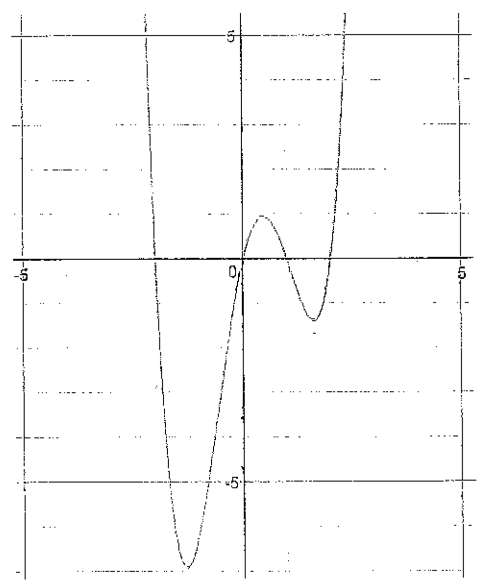
As $x \to -\infty, h(x) \to$ _____ As $x \to \infty, h(x) \to$ _____

Roots (with multiplicity):

Degree:

Value of $h(2)$:

13. **Graph:**



Function in standard form:

Function in factored form:

End behavior:

As $x \to -\infty, f(x) \to$ _____ As $x \to \infty, f(x) \to$ _____

Roots (with multiplicity):

Degree:

y-intercept:

14.

Function in standard form:

Function in factored form:

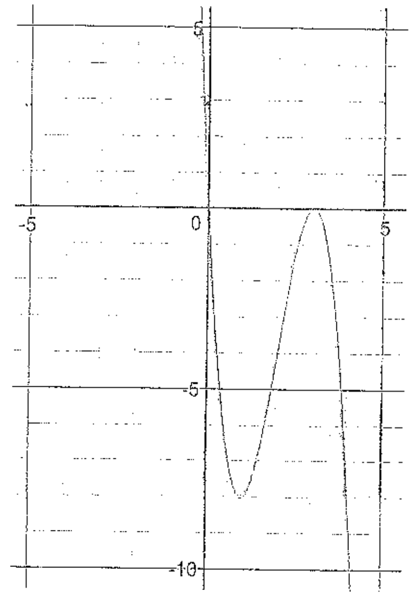
End behavior:
As $x \to -\infty, p(x) \to$ _____ As $x \to \infty, p(x) \to$ _____

Roots (with multiplicity):

Degree:

Value of leading coefficient:

Graph:



15.

Function in standard form: $q(x) = x^3 + 2x^2 + x + 2$

Function in factored form:

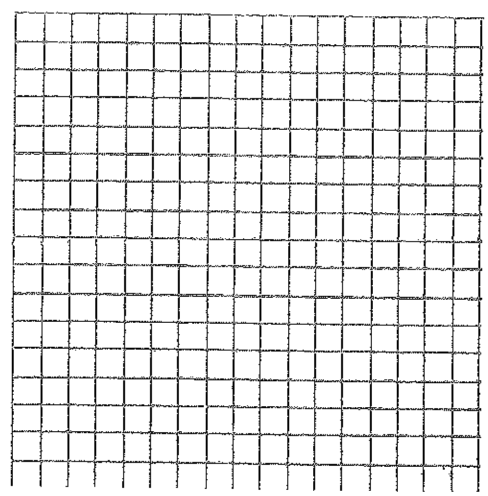
End behavior:
As $x \to -\infty, q(x) \to$ _____ As $x \to \infty, q(x) \to$ _____

Roots (with multiplicity):
$x = i$

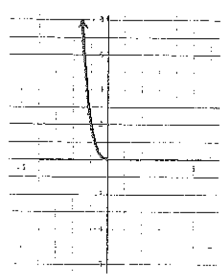
Degree:

y-intercept:

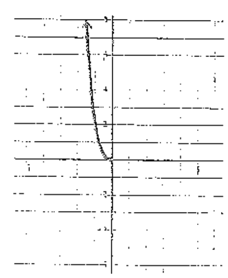
Graph:



16. Finish the graph if it is an even function.



17. Finish the graph if it is an odd function.



GO

Topic: Writing polynomials given the zeros and the leading coefficient

Write the polynomial function in standard form given the leading coefficient and the zeros of the function.

18. Leading coefficient: 2; *roots*: $2, \sqrt{2}, -\sqrt{2}$

19. Leading coefficient: -1; *roots*: $1, 1+\sqrt{3},\ 1-\sqrt{3}$

20. Leading coefficient: 2; *roots*: $4i, -4i$

Fill in the blanks to make a true statement.

21. If $f(b) = 0$, then a factor of $f(b)$ must be ______________________.

22. The rate of change in a linear function is always a ______________________.

23. The rate of change of a quadratic function is _____________________________.

24. The rate of change of a cubic function is _______________________________.

25. The rate of change of a polynomial function of degree n can be described by a function of degree _______________.