Name _____ Class _____ Date _____

Common Core Standards Practice — Week 8

Selected Response

1. Describe the end behavior of the polynomial $f(x) = x^8 - 8x^4 + 6x^2$.

A down and down
B down and up
C up and down
D up and up

Constructed Response

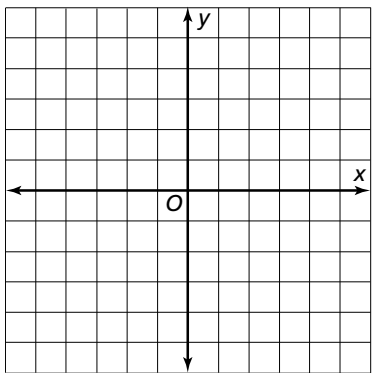
2. Andrew needs a set of wheels, a truck, and a deck to build a skateboard. A deck costs \$1 more than a truck. A truck costs \$1 more than a set of wheels. The product of the cost of the three parts is 5 times the sum of the cost of the parts. Write a polynomial function to model the cost of building the skateboard.

Extended Response

3. a. Find all of the solutions of $f(x) = -2x^2 - 5x + 7$ by factoring.

b. Explain how to use your solutions from part (a) to graph the polynomial.

c. Graph the function.



OVERVIEW

Looking Back	Mathematics of the Week	Looking Ahead
In Chapter 4, students have learned the concepts related to quadratic functions and graphs (F.IF.C.7.a, F.IF.C.8.a, F.LE.A.3).	Students need to understand the behaviors of polynomial functions and graphs. Students need to write a polynomial function to model a given situation.	Later in this chapter students will learn about other ways to graph and find the roots of polynomial functions (A.APR.B.2, A.APR.B.3, F.IF.C.7.c).

COMMON CORE CONTENT STANDARDS

F.IF.B.4 For a function that models a relationship between two quantities, interpret key features of graphs and tables…

F.IF.C.7 Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.

F.BF.A.1 Write a function that describes a relationship between two quantities.

A.APR.B.3 Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.

A.SSE.A.2 Use the structure of an expression to identify ways to rewrite it.…

A.REI.D.11 Explain why the x-coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$;…

Mathematical Practice Standards: 1, 2, 4, 5, 6, 7, 8

TEACHING NOTES

Selected Response

1. *Error Analysis*: Students describe the shape of the graph of a polynomial function. If the student answers A, B, or C, he or she does not know the rules for determining end behavior based on the leading term of the polynomial. The leading term x^8 has an even degree and positive coefficient indicating up and up end behavior.

Constructed Response

2. Students write a polynomial function that models a real-world situation. Have students define the variable x to represent the cost of the deck, truck, or set of wheels. Ask students to define the other two costs in terms of x. Ask students to translate the third sentence into an equation. Ask students to simplify the equation, and write it as a polynomial function. Remind students that this polynomial describes the cost of building a skateboard based on the variable that they defined.

Extended Response

3. Students solve a quadratic function by factoring and use the solutions to graph the function. Remind students that the real solutions of a polynomial equation are also zeros and x-intercepts. Suggest that students determine end behavior and make use of symmetry.

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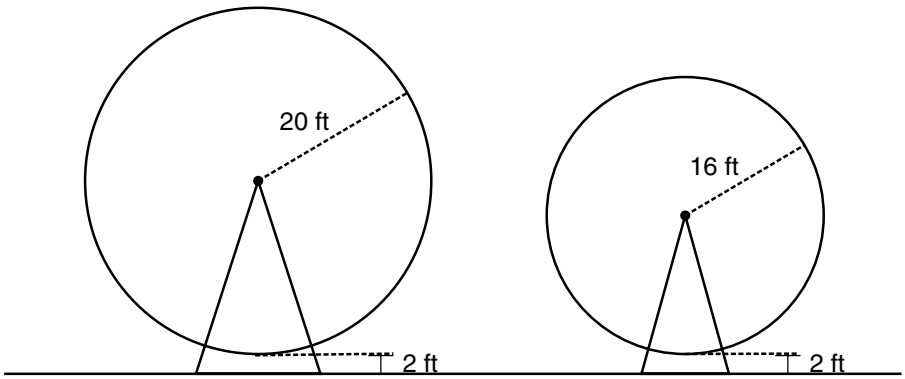
Performance Task: Modeling Ferris Wheel Rides

Complete this performance task in the space provided. Fully answer all parts of the performance task with detailed responses. You should provide sound mathematical reasoning to support your work.

You and your friend go to the county fair. There are two Ferris wheels there, like the ones shown below. For each Ferris wheel, riders travel 24 feet per minute along the wheel's circumference. The wheels are 2 ft above the ground.



Not to scale

Task Description

Assume that you start at the bottom of the larger wheel and your friend starts at the bottom of the smaller wheel at the same time. When will you and your friend be at the same height above the ground? How high will that be?

a. How long does the larger wheel take to complete 1 revolution? Round to the nearest hundredth of a minute.

b. Without calculating, how do you know that you and your friend will NOT reach the top of your wheels at the same time?

Performance Task: Modeling Ferris Wheel Rides (continued)

c. What is the period for the revolution of the smaller Ferris wheel? Round to the nearest hundredth of a minute.

d. Write functions to model the heights above the ground of you and your friend with respect to time.

e. Use a graphing calculator to graph the functions over the domain 0 to 7 minutes. Use the **intersect** or **trace** feature to determine when you and your friend will first be at the same height after the ride starts. What is this height?

f. Find the second time and height when you and your friend will be at the same height.

g. Use the graphs to estimate the times, between 0 and 7 minutes, when the difference between your heights will be the greatest.

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Performance Task 2 Scoring Rubric

Modeling Ferris Wheel Rides

The Scoring Rubric proposes a maximum number of points for each of the parts that make up the Performance Task. The maximum number of points is based on the complexity and difficulty level of the sub-task. For some parts, you may decide to award partial credit to students who may have shown some understanding of the concepts assessed, but may not have responded fully or correctly to the question posed.

Task Parts	Maximum Points
a. Circumference of the larger wheel: $2\pi(20 \text{ ft}) = 40\pi$ ft Since it is traveling at 24 feet per minute, the time it takes to complete 1 revolution is $40\pi \div 24 \approx 5.23$ minutes.	4
b. It will take more time to reach the top on the larger wheel, because the distance is greater and the speeds are equal.	2
c. Circumference of the smaller wheel: $2\pi(16 \text{ ft}) = 32\pi$ ft Since it is traveling at 24 feet per minute, the period for the revolution is $32\pi \div 24 \approx 4.19$ minutes.	4
d. Use a cosine function of the form $y = a\cos bx$, with a = amplitude, $\frac{2\pi}{b}$ = period, and x = angle measure in radians. Then shift right and up. You: $y = 20\cos\left(\frac{2\pi}{5.23}\left(x - \frac{5.23}{2}\right)\right) + 22$. Your friend: $y = 16\cos\left(\frac{2\pi}{4.19}\left(x - \frac{4.19}{2}\right)\right) + 18$.	4
e. The graphs first intersect at (1.72, 31.6); you will be at the same height after 1.72 minutes, and your height above the ground will be 31.6 feet.	2
f. The graphs intersect next at (4.68, 6.17); you will be at the same height again after 4.68 minutes, and your height above the ground will be 6.17 feet.	2
g. The times when the difference between your heights will be greatest are close to 5.8 minutes after starting the ride.	2
Total points	**20**