

Core Content

Cluster Title: Reason quantitatively and use units to solve problems.
Standard N.Q.1: Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
Concepts and Skills to Master
<ul style="list-style-type: none"> • Select and use appropriate units of measurement for problems with and without context. • Given a graph draw conclusions and make inferences. • Choose appropriate scales to create linear and exponential graphs. • Determine from the labels on a graph what the units of the rate of change are (e.g., gallons per hour).

Supports for Teachers

Critical Background Knowledge	
<ul style="list-style-type: none"> • Know how various attributes are reasonably measured. 	
Academic Vocabulary	
Scale, units of measurement	
Suggested Instructional Strategies	Resources
<ul style="list-style-type: none"> • Explore a variety of examples of measurements used in graphs. • Construct graphs using a variety of data sets. 	
Sample Formative Assessment Tasks	
Skill-based Task What is the area of a strip of wall that is 48 inches by 10 yards?	Problem Task Your college savings fund has \$1800 in it and you plan to spend \$30 a week. What would be an appropriate viewing window and scale to see the remaining balance each week until the money is gone? Explain.

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Cluster Title: Reason quantitatively and use units to solve problems.
Standard: N.Q.2 Define appropriate quantities for the purpose of descriptive modeling.
Concepts and Skills to Master
<ul style="list-style-type: none"> Choose appropriate measures and units for problem situations. Create a relationship among different units (i.e., feet per second, bacteria per hour, miles per gallon).

Supports for Teachers

Critical Background Knowledge	
<ul style="list-style-type: none"> Compute unit rates associated with ratios of fractions. Recognize and calculate basic conversions (e.g., 3 feet = 1 yard). 	
Academic Vocabulary	
Unit rates, modeling, quantity, unit conversion, proportion, ratio	
Suggested Instructional Strategies	Resources
<ul style="list-style-type: none"> Integrate this objective into problem solving throughout the curriculum. Place an emphasis on relationships between two different units (e.g., dollars per hour, pressure over altitude, calories per gram). 	www.illustrations.NCTM.org <ul style="list-style-type: none"> Flowing through Mathematics
Sample Formative Assessment Tasks	
Skill-based Task How would you measure the rate at which a bathtubfills? Justify your answer.	Problem Task Create a scenario you have encountered involving two changing quantities and determine appropriate units to describe the relationship between the quantities.

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Cluster Title: Reason quantitatively and use units to solve problems.
Standard N.Q.3: Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
Concepts and Skills to Master
<ul style="list-style-type: none"> • Determine whether whole numbers, fractions, or decimals are most appropriate. • Determine the appropriate power of ten to reasonably measure a quantity. • Determine the resulting accuracy in calculations. • Determine what level of rounding should be used in a problem situation.

Supports for Teachers

Critical Background Knowledge	
<ul style="list-style-type: none"> • Understand basic units of measurements and their relationship to one another (e.g., a foot is smaller than a yard). • Understand how to properly round and estimate. 	
Academic Vocabulary	
Precision, accuracy	
Suggested Instructional Strategies	Resources
<ul style="list-style-type: none"> • Discuss misconceptions in resulting calculations involving measurement, e.g., you cannot increase accuracy through calculation, only through more accurate measurement. • Compare the difference between rounding at difference places in a calculation and discuss which yields the best result. • Discuss how mathematicians maintain precision through the representations that they use. 	
Sample Formative Assessment Tasks	
Skill-based Task What is a sensible level of accuracy with which to measure: <ul style="list-style-type: none"> • The distance from you to the door in inches? • The distance from you to the moon in miles? • The weight of an elephant in pounds? • The volume of a basketball in cubic inches? 	Problem Task A rectangle is measured to be 3.4 cm x 5.2 cm. Why is it not accurate to say that the area of the rectangle is 17.68 cm ² ?