Math Grade 7
Assessment Anchors
and Eligible Content

Pennsylvania Department of Education

www.pde.state.pa.us

2007

M7.A Numbers and Operations — Reporting Category

ASSESSMENT ANCHOR

M7.A.1 Demonstrate an understanding of numbers, ways of representing numbers, relationships among numbers and number systems.

	ELIGIBLE CONTENT
M7.A.1.1 Express numbers in equivalent forms.	**M7.A.1.1.1** Convert between fractions, decimals and/or percents (e.g., 20% = 0.2 = 1/5) (terminating decimals only).

EXAMPLE ITEMS

- Note: This problem is solved without a calculator

  Joshua buys a book that is on sale for $\frac{1}{5}$ off.

  What is the percent of discount for the price of the book?

  A. $\frac{1}{20}$%

  B. $\frac{1}{5}$%

  C. 5%

  * D. 20%

(Maryland State Department of Education)

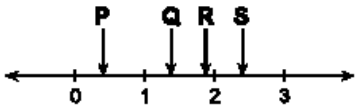
ASSESSMENT ANCHOR

M7.A.1 Demonstrate an understanding of numbers, ways of representing numbers, relationships among numbers and number systems.

	ELIGIBLE CONTENT
M7.A.1.2 Compare quantities and/or magnitudes of numbers.	**M7.A.1.2.1** Compare and/or order integers, mixed numbers, fractions and decimals (fractions and decimals may be mixed – no more than 5 numbers in a set to be ordered). **M7.A.1.2.2** Locate/identify decimals, fractions, mixed numbers and/or integers on a number line (a mix of these number forms may be on the same number line).

EXAMPLE ITEMS

- Use the number line below to answer the question.



Which point on the number line is closest to $\frac{22}{17}$?

A. point P
* B. point Q
C. point R
D. point S

(New Hampshire Department of Education)

- In which list of fractions are all of the fractions equivalent?

A. $\frac{1}{2}, \frac{2}{4}, \frac{4}{6}$
* B. $\frac{2}{3}, \frac{4}{6}, \frac{8}{12}$
C. $\frac{2}{5}, \frac{4}{10}, \frac{8}{50}$
D. $\frac{3}{4}, \frac{4}{6}, \frac{6}{8}$

(TIMSS)

ASSESSMENT ANCHOR

M7.A.2 Understand the meanings of operations, use operations and understand how they relate to each other.

	ELIGIBLE CONTENT
M7.A.2.1 Complete calculations by applying the order of operations.	**M7.A.2.1.1** Use the order of operations to simplify numerical expressions (may use parentheses, brackets, +, -, x, ÷, squares up to 10^2 and cubes up to 4^3; whole numbers only).

EXAMPLE ITEMS

- Which of the following is a true sentence?

  * A. 2 + (3 x 5) – 4 = 13
  B. (2 + 3) x 5 – 4 = 13
  C. (2 + 3) x (5 – 4) = 13
  D. none of the above

(New Hampshire Department of Education)

- Look at the expression below.
  12 + 4 x (12 – 9)

  What is the value of the expression?

  * A. 24
  B. 48
  C. 51
  D. 55

(Maryland State Department of Education)

ASSESSMENT ANCHOR

M7.A.2 Understand the meanings of operations, use operations and understand how they relate to each other.

	ELIGIBLE CONTENT
M7.A.2.2 Solve problems using ratios, proportions, percents and/or rates.	**M7.A.2.2.1** Write ratios to compare quantities (e.g., ratio of boys to girls).
	M7.A.2.2.2 Solve for a variable in a given proportion.
	M7.A.2.2.3 Use proportions to determine if two quantities are equivalent (e.g., similar figures, prices of different sized items, etc).
	M7.A.2.2.4 Calculate and/or apply unit rates or unit prices (terminating decimals through the hundredth place only).
	M7.A.2.2.5 Select and/or use ratios or proportions to solve problems.
	M7.A.2.2.6 Use proportions to find the missing length of a side in similar figures.

EXAMPLE ITEMS

ASSESSMENT ANCHOR

M7.A.3 Compute accurately and fluently and make reasonable estimates.

	ELIGIBLE CONTENT
M7.A.3.1 Apply estimation strategies to a variety of problems.	**M7.A.3.1.1** Estimate answers to problems involving whole numbers, decimals, fractions or mixed numbers.

EXAMPLE ITEMS

- Use the picture below to answer the question.

The Anderson family consists of two adults and two children, Brian, age 5, and Andrea, age 3. Which is the closest estimate of what it will cost the family to ride on the Scenic Railroad?

A. $30.00
* B. $20.00
C. $15.00
D. $10.00

(New Hampshire Department of Education)

ASSESSMENT ANCHOR

M7.A.3 Compute accurately and fluently and make reasonable estimates.

	ELIGIBLE CONTENT
M7.A.3.2 Compute accurately with and without use of a calculator.	**M7.A.3.2.1** Solve problems involving operations (+, -, x, ÷) of whole numbers, decimals, fractions, or mixed numbers (straight computation or word problems) **M7.A.3.2.2** Solve problems involving addition and subtraction of integers.

EXAMPLE ITEMS

M7.B Measurement — Reporting Category

ASSESSMENT ANCHOR

M7.B.1 Demonstrate an understanding of measurable attributes of objects and figures, and the units, systems and processes of measurement.

	ELIGIBLE CONTENT
M7.B.1.1 Add, subtract, or convert measurements.	**M7.B.1.1.1** Add, subtract, or convert measurements, using only the units below, with and without regrouping (e.g., 4ft – 2ft 5in = 1ft 7in). Answer should be converted to the largest whole unit (e.g., 37oz = 2 Lb 5oz or 39 in = 1 yd 3 in. Conversion chart provided on the reference sheet. • in, ft, yd • fl oz, cup, pint, quart, gallon • oz, Lb • sec, min, hours, days • metric units including milli, centi and kilo (m, g or L)

EXAMPLE ITEMS

- At the state track meet, Steve averaged 1 minute, 28 seconds, per lap. How long did it take him to finish the four-lap race?

  A. 5 minutes, 12 seconds
  B. 5.12 minutes
  *C. 5 minutes, 52 seconds
  D. 5.52 minutes

(New Hampshire Department of Education)

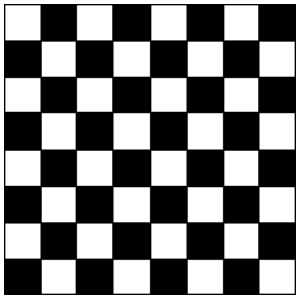
ASSESSMENT ANCHOR

M7.B.2 Apply appropriate techniques, tools and formulas to determine measurements.

	ELIGIBLE CONTENT
M7.B.2.1 Develop, use and/or describe strategies to find the measure of length, perimeter, circumference, area or volume.	**M7.B.2.1.1** Develop and/or use strategies to find the perimeter and/or area of compound figures (compound figures should only include quadrilaterals and triangles). Area formulas provided on the reference sheet. **M7.B.2.1.2** Find the circumference and/or area of circles (formulas provided on the reference sheet). **M7.B.2.1.3** Find the area of triangles and/or all types of parallelograms (formulas provided on the reference sheet).

EXAMPLE ITEMS

- The square chessboard shown below has an area of 144 square inches.



Note: The figure is not drawn to scale.

What is the length, in inches, of one side of the chessboard?

A. 6 inches
* B. 12 inches
C. 36 inches
D. 72 inches

(Maryland State Department of Education)

M7.B Measurement — Reporting Category

ASSESSMENT ANCHOR

M7.B.2 Apply appropriate techniques, tools and formulas to determine measurements.

	ELIGIBLE CONTENT
M7.B.2.2 Construct, interpret and/or use scale drawings to solve real-world problems.	**M7.B.2.2.1** Interpret and/or apply scales shown on maps, blueprints, models, etc. **M7.B.2.2.2** Determine and/or apply an appropriate scale for reduction or enlargement.

EXAMPLE ITEMS

ASSESSMENT ANCHOR

M7.C.1 Analyze characteristics and properties of two- and three- dimensional geometric shapes and demonstrate understanding of geometric relationships.

	ELIGIBLE CONTENT
M7.C.1.1 Define and/or apply basic properties of two- and three-dimensional geometric shapes.	**M7.C.1.1.1** Identify, describe and/or define diameter, radius, chord and/or circumference in circles. **M7.C.1.1.2** Solve problems involving the relationship between the radius and diameter of the same circle. **M7.C.1.1.3** Identify parallel, perpendicular and/or skew line segments within three-dimensional figures.

EXAMPLE ITEMS

ASSESSMENT ANCHOR

M7.C.1 Analyze characteristics and properties of two- and three- dimensional geometric shapes and demonstrate understanding of geometric relationships.

	ELIGIBLE CONTENT
M7.C.1.2 Identify congruence and/or similarity in polygons.	**M7.C.1.2.1** Identify and/or use polygons that are similar and/or congruent, given either measurements or tic and angle marks. **M7.C.1.2.2** Identify corresponding sides and/or angles of congruent or similar polygons.

EXAMPLE ITEMS

ASSESSMENT ANCHOR

M7.C.2 Identify and/or apply concepts of transformations or symmetry.

ELIGIBLE CONTENT

Not assessed at Grade 7.

EXAMPLE ITEMS

ASSESSMENT ANCHOR

M7.C.3 Locate points or describe relationships using the coordinate plane.

	ELIGIBLE CONTENT
M7.C.3.1 Locate, plot and/or describe points on a coordinate plane.	**M7.C.3.1.1** Plot and/or identify ordered pairs on a coordinate plane (all four quadrants).
	M7.C.3.1.2 Identify Quadrants I, II, III, IV, the x- & y-axes and the origin on a coordinate plane.

EXAMPLE ITEMS

ASSESSMENT ANCHOR

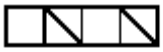
M7.D.1 Demonstrate an understanding of patterns, relations and functions.

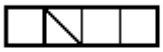
	ELIGIBLE CONTENT
M7.D.1.1 Recognize, reproduce, extend and/or describe patterns.	**M7.D.1.1.1** Describe, extend or find a missing element of a pattern (show 3 repetitions of the pattern) • fractions or decimals - may use only one operation from +, - or x • whole numbers – may use only one operation from +, -, x, ÷ or squares

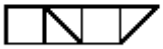
EXAMPLE ITEMS

- Use the pattern below to answer the question.

What is the next figure in this pattern?

* A. 

B. 

C. 

D.

(New Hampshire Department of Education)

M7.D Algebraic Concepts — Reporting Category

ASSESSMENT ANCHOR

M7.D.2 Represent and/or analyze mathematical situations using numbers, symbols, words, tables and/or graphs.

	ELIGIBLE CONTENT
M7.D.2.1 Select and/or use appropriate strategies to solve or represent equations or expressions.	**M7.D.2.1.1** Select and/or use appropriate strategies to solve one-step equations (no negative numbers). **M7.D.2.1.2** Use substitution of one and/or two variables to simplify expressions (whole numbers only – use order of operations).

EXAMPLE ITEMS

- Given the replacement set {11, 13, 105, 109}, what must *n* be to make the sentence true?

  $3 \times n - 2 = 37$

  A. 11
  *B. 13
  C. 105
  D. 109

(New Hampshire Department of Education)

M7.D Algebraic Concepts — Reporting Category

ASSESSMENT ANCHOR

M7.D.2 Represent and/or analyze mathematical situations using numbers, symbols, words, tables and/or graphs.

	ELIGIBLE CONTENT
M7.D.2.2 Create and/or interpret expressions, equations or inequalities that model problem situations.	**M7.D.2.2.1** Identify expressions, equations or inequalities that model mathematical situations (using whole numbers or decimals, no more than two operations and one variable).

EXAMPLE ITEMS

ASSESSMENT ANCHOR
M7.D.3 Analyze change in various contexts.

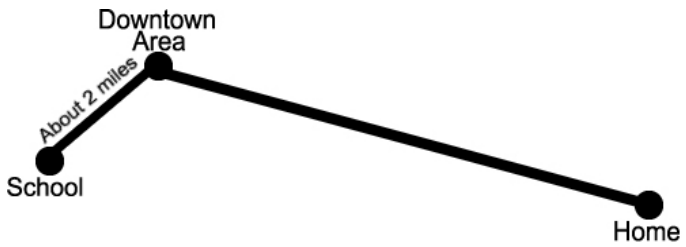
	ELIGIBLE CONTENT
M7.D.3.1 Describe the relationship between two variables (e.g., time, temperature).	**M7.D.3.1.1** Solve problems involving a constant rate of change (e.g., word problems, graphs or data tables). **M7.D.3.1.2** Describe and/or use the relationship of data displayed on a rate of change graph (e.g., how does the x-axis data relate to the y-axis data).

EXAMPLE ITEMS

- Daniel drove 480 km in 4 hours. If Daniel continues driving at the same speed, how long will it take him to drive an additional 720 km?

  A. 18 hours
  B. 12 hours
  * C. 6 hours
  D. 3 hours

(Pennsylvania Department of Education)

- 

  It takes Jan 10 minutes to skate downtown from school. Skating at the same speed, it takes about 38 minutes to skate home from downtown. About how far from downtown does Jan live?

  A. 2 miles
  B. 4 miles
  * C. 8 miles
  D. 13 miles

(New Hampshire Department of Education)

ASSESSMENT ANCHOR

M7.D.4 Describe or use models to represent quantitative relationships.

ELIGIBLE CONTENT

Not assessed at Grade 7.

EXAMPLE ITEMS

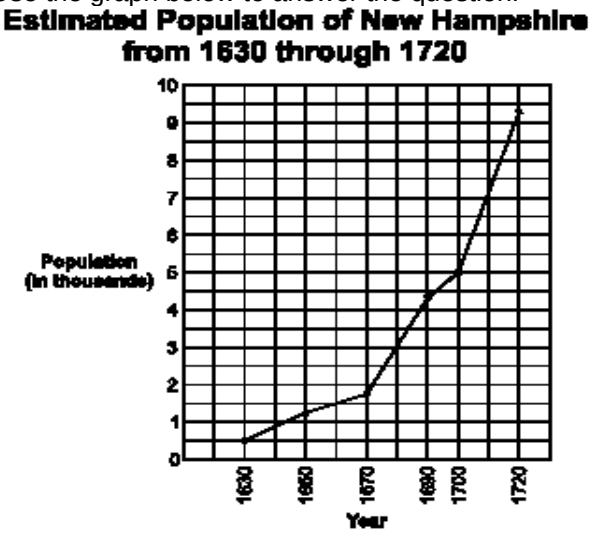
ASSESSMENT ANCHOR

M7.E.1 Formulate or answer questions that can be addressed with data and/or organize, display, interpret or analyze data.

	ELIGIBLE CONTENT
M7.E.1.1 Interpret data shown in complex data displays.	**M7.E.1.1.1** Analyze data and/or answer questions pertaining to data represented in histograms, double bar graphs, multiple line graphs or stem-and-leaf plots.

EXAMPLE ITEMS

- Use the graph below to answer the question.



According to this graph, during which 20-year period did the colonial population of New Hampshire grow fastest?

* A. 1700 – 1720
B. 1670 – 1690
C. 1650 – 1670
D. 1630 – 1650

(New Hampshire Department of Education)

ASSESSMENT ANCHOR

M7.E.2 Select and/or use appropriate statistical methods to analyze data.

	ELIGIBLE CONTENT
M7.E.2.1 Describe, compare and/or contrast data using measures of mean, median, mode or range.	**M7.E.2.1.1** Identify/calculate the mean (average), median, mode or range of a set of data. **M7.E.2.1.2** Decide/choose which measure of central tendency (mean, median, mode or range) would be most appropriate for a given situation.

EXAMPLE ITEMS

- The salaries of the employees at Dean's Print Shop are $24,000, $37,000, $12,000, $17,000, $26,000, $40,000 and $19,000.

  What is the median salary of the employees

  A. $25,000
  * B. $24,000
  C. $17,000
  D. $12,000

  (New Jersey Department of Education)

- Tetsu rides his bicycle x miles for the first day, y miles the second day, and z miles the third day. Which of the following expressions represents the average number of miles per day that Tetsu travels?

  A. x + y +z
  B. xyz
  C. 3(x + y + z)
  D. 3(xyz)
  * E. (x + y + z)/3

  (NAEP)

- The table shows the number of gallons of paint sold at a paint store each week in one month.

Week	Average Number of Gallons Sold
1	235
2	412
3	357
4	286

  What was the MEAN number of gallons of paint sold each week at this store?

  A. 321.5
  B. 177
  C. 260.5
  D. 322.5

  (Connecticut Department of Education)

ASSESSMENT ANCHOR

M7.E.3 Understand and/or apply basic concepts of probability or outcomes.

	ELIGIBLE CONTENT
M7.E.3.1 Determine theoretical or experimental probability.	**M7.E.3.1.1** Find the theoretical probability of a simple and/or compound event (answer written as a fraction in lowest terms – any compound events should be independent)
	M7.E.3.1.2 Find the theoretical probability of an event **not** occurring (e.g., what is the probability of not rolling a 1 on a number cube)
	M7.E.3.1.3 Use data displayed in charts, graphs or tallies to find experimental probability

EXAMPLE ITEMS

ASSESSMENT ANCHOR

M7.E.4 Develop and/or evaluate inferences and predictions or draw conclusions based on data or data displays.

	ELIGIBLE CONTENT
M7.E.4.1 Draw conclusions and/or make predictions based on data displays.	**M7.E.4.1.1** Formulate predictions and/or draw conclusions based on data displays (bar graphs, circle graphs or line graphs) or probability.

EXAMPLE ITEMS

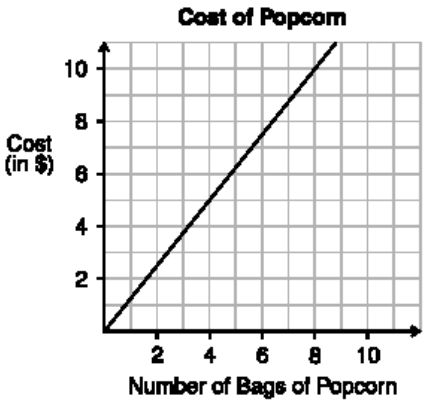
- This table lists the average temperatures recorded on Mt. Washington over a 30-year period. Based on the table, what is the most likely average temperature on Mt. Washington in October?

Month	Temperature (°C)
Jan.	-15
Mar.	-10
May	1
Jul.	9
Sep.	4
Nov.	-6

A. –5°C
* B. –1°C
C. 1°C
D. 5°C

(New Hampshire Department of Education)

- Use the graph below to answer the question.



According to the graph, how much would four bags of popcorn cost?

A. $4.00
B. $4.25
C. $4.50
* D. $5.00

(New Hampshire Department of Education)