

Math Grade 8 Assessment Anchors and Eligible Content



Pennsylvania Department of Education

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2007

M8.A Numbers and Operations

Reporting Category

ASSESSMENT ANCHOR

M8.A.1 Demonstrate an understanding of numbers, ways of representing numbers, relationships among numbers and number systems.

ELIGIBLE CONTENT

M8.A.1.1 Represent numbers in equivalent forms.

Reference: 2.1.8.A, 2.1.8.B

~~**M8.A.1.1.1** Convert fractions, decimals and/or percents to equivalent forms (e.g., $1/3 = 33\frac{1}{3}\% = .333$).~~

Assessed at Grade 7.

M8.A.1.1.1 Represent numbers using scientific notation and/or exponential forms to express numbers.

M8.A.1.1.2 Find the square or cube of a whole number (single digit) and/or the square root of a perfect square (without a calculator).

EXAMPLE ITEMS

- The earth is approximately 93,000,000 miles from the sun. What is the distance written in scientific notation?

- A. 9.3×10^6
- B. 93×10^6
- C. 93×10^7
- * D. 9.3×10^7

(Maryland Department of Education)

- Which number represents 4.5×10^4 written in standard notation?

- A. 0.00045
- B. 0.000045
- * C. 45,000
- D. 450,000

(Pennsylvania Department of Education)

- The number 5.12×10^8 is written in scientific notation. How would it be written in standard form?

- A. 0.0000000512
- B. 51,200,000
- * C. 512,000,000
- D. 51,200,000,000

(Pennsylvania Department of Education)

- Liang got an answer of about 3.87 when she entered 15 on her calculator and pressed the ($\sqrt{\quad}$) key. As usual, she stopped to think briefly about whether or not her calculator's answer was reasonable. Which of the following statements is the most likely explanation for her to believe that her calculator's answer is or not reasonable?

- A. It is not reasonable, because the answer should be a whole number.
- * B. It is reasonable because 3 squared is 9 while 4 squared is 16.
- C. It is not reasonable, because the answer should be only slightly more than 3.
- D. It is reasonable, because 15 is an odd number.

(New Jersey Department of Education)

M8.A Numbers and Operations**Reporting Category****ASSESSMENT ANCHOR**

M8.A.1 Demonstrate an understanding of numbers, ways of representing numbers, relationships among numbers and number systems.

ELIGIBLE CONTENT

M8.A.1.2 Compare quantities or magnitudes of real numbers.

Reference: 2.1.8.C

~~**M8.A.1.2.1** Locate or plot decimals, fractions, mixed numbers and/or integers on a number line (a mix of these number forms may be on the same number line).~~

Assessed at Grade 7.

~~**M8.A.1.2.2** Order a set (up to 5 numbers) of decimals, fractions, mixed numbers and/or integers from least to greatest (a mix of these number forms may be in the same set).~~

Assessed at Grade 7.

EXAMPLE ITEMS

M8.A Numbers and Operations**Reporting Category****ASSESSMENT ANCHOR**

M8.A.1 Demonstrate an understanding of numbers, ways of representing numbers, relationships among numbers and number systems.

ELIGIBLE CONTENT

M8.A.1.3 Apply number theory concepts.

Reference: 2.1.5.G

~~**M8.A.1.3.1** Use divisibility rules for 2, 3, 5 and 10 to draw conclusions and/or solve problems.~~

Assessed at Grade 6.

~~**M8.A.1.3.2** Find and/or use the Greatest Common Factor (GCF) and/or Least Common Multiple (LCM) of 2 or 3 numbers.~~

Assessed at Grade 6.

EXAMPLE ITEMS

M8.A Numbers and Operations

Reporting Category

ASSESSMENT ANCHOR

M8.A.2 Understand the meanings of operations, use operations and understand how they relate to each other.

ELIGIBLE CONTENT

M8.A.2.1 Complete calculations by applying the order of operations.

Reference: 2.2.8.A

M8.A.2.1.1 Simplify **numeric** expressions involving integers, using the order of operations. (**May** include all types of grouping symbols. **No combining negatives with exponents or compound exponents.**)

EXAMPLE ITEMS

- $3^3 + 4(8 - 5) \div 6 =$

- * A. 6.5
- B. 11
- C. 27.5
- D. 29
- E. 34.16

(NAEP)

- What is the value of the expression:

$$2^3 + (3 \cdot 10^3) 82 - 16?$$

- A. 7,370
- B. 7,372
- C. 198,008
- * D. 245,992

(Pennsylvania Department of Education)

- Evaluate

$$7 + 5[(3 + 2)^2 - (2^3 + 1)]$$

- A. 22
- B. 36
- * C. 87
- D. 97

(Pennsylvania Department of Education)

M8.A Numbers and Operations

Reporting Category

ASSESSMENT ANCHOR

M8.A.2 Understand the meanings of operations, use operations and understand how they relate to each other.

ELIGIBLE CONTENT

M8.A.2.2 Represent or solve problems using rates, ratios, proportions and/or percents.

Reference: 2.1.8.D, 2.3.8.B

~~**M8.A.2.2.1** Select or use ratios, proportions and percents to solve problems (e.g., tax, discounts, etc.) — straight computation or word problems — no percent increase or decrease).~~

Assessed at Grade 7.

M8.A.2.2.1 Solve problems involving percents (e.g., tax, discounts, etc) Do not include percent increase or decrease.

M8.A.2.2.2 Represent or solve rate problems (e.g., unit rates, simple interest, distance, etc.) Students may be asked to solve for any term (formulas provided on the reference sheet for distance and interest).

EXAMPLE ITEMS

- A secretary can type 56 words per minute. How much time will she need to type a 4200-word report?
 - A. 7 hours 30 minutes
 - B. 1 hour 4 minutes
 - C. 1 hour 28 minutes
 - * D. 1 hour 15 minutes

(Pennsylvania Department of Education)

- In 1991, an American, Ann Trason, set a world record by running 100 km in

| Hours | Minutes | Seconds |
|-------|---------|---------|
| 7 | 50 | 09 |

Which is the best estimate of her average speed?

- * A. 12 km per hr
- B. 14 km per hr
- C. 16 km per hr
- D. 18 km per hr

(New Jersey Department of Education)

- A runner ran 3000 m in exactly 8 minutes. What was his average speed in meters per second?
 - A. 3.75
 - * B. 6.25
 - C. 16.0
 - D. 37.5
 - E. 62.5

(TIMSS)

M8.A Numbers and Operations

Reporting Category

ASSESSMENT ANCHOR**M8.A.3 Compute accurately and fluently and make reasonable estimates.****ELIGIBLE CONTENT**

M8.A.3.1 Determine the appropriateness of overestimating, underestimating or calculating an exact answer in problem-solving situations.

Reference: 2.2.8.F

M8.A.3.1.1 Identify, use [apply](#) and/or explain when it is appropriate to round up or round down.

M8.A.3.1.2 Identify, apply and/or explain when an exact answer is needed or when estimation is appropriate.

EXAMPLE ITEMS

M8.A Numbers and Operations**Reporting Category****ASSESSMENT ANCHOR****M8.A.3 Compute accurately and fluently and make reasonable estimates.****ELIGIBLE CONTENT****M8.A.3.2** Use estimation strategies in problem-solving situations.**Reference: 2.2.8.D****M8.A.3.2.1** Estimate answers to problems involving percents (**percents will be limited to:** 1%, 10%, 15%, 20%, 25%, 50% or 75%).**EXAMPLE ITEMS**

- Ken bought a used car for \$5,375. He had to pay an additional 15 percent of the purchase price to cover both sales tax and extra fees. Of the following, which is the closest to the total amount Ken paid?

- A. \$806
- B. \$5,510
- C. \$5,760
- D. \$5,940
- * E. \$6,180

(NAEP)

- A state law requires that students attend school 180 days out of the 365 days in a year. Approximately what percent of a year must students attend school?

- A. 2%
- * B. 50%
- C. 75%
- D. 200%

(Pennsylvania Department of Education)

M8.A Numbers and Operations

Reporting Category

ASSESSMENT ANCHOR

M8.A.3 Compute accurately and fluently and make reasonable estimates.

ELIGIBLE CONTENT

M8.A.3.3 Compute and/or explain operations with integers, fractions and/or decimals.

Reference: 2.2.8.B

M8.A.3.3.1 Add, subtract, multiply and/or divide integers, fractions and/or decimals with and without a calculator (straight computation or word problems).

EXAMPLE ITEMS

- Subtract (-)

$$\begin{array}{r} 14\frac{5}{8} \\ - 6\frac{5}{8} \\ \hline \end{array}$$

- A. $8\frac{5}{24}$
- B. $21\frac{11}{24}$
- * C. 8
- D. $7\frac{19}{24}$

(Pennsylvania Department of Education)

- Divide (÷)

$$\frac{3}{0.24}$$

- A. 0.08
- B. 0.72
- * C. 12.5
- D. 125.00

(Pennsylvania Department of Education)

- Subtract (-)

$$\begin{array}{r} 11 \\ - 1\frac{2}{3} \\ \hline \end{array}$$

- * A. $9\frac{1}{3}$
- B. $9\frac{2}{3}$
- C. $10\frac{1}{3}$
- D. $10\frac{2}{3}$

(Pennsylvania Department of Education)

M8.B Measurement**Reporting Category****ASSESSMENT ANCHOR**

M8.B.1 Demonstrate an understanding of measurable attributes of objects and figures, and the units, systems and processes of measurement.

ELIGIBLE CONTENT

M8.B.1.1 Convert measurements.

Reference: 2.3.5.D

M8.B.1.1.1 Convert among **all**-metric measurements (milli, centi, **deci**, **deka**, **hecto**, kilo using meter, liter and gram) (table of equivalency provided on the reference sheet).

M8.B.1.1.2 Convert customary measurements **up** to 2 units above or below the given unit (e.g., inches to yards, pints to gallons) (table of equivalency provided on the reference sheet).

M8.B.1.1.3 Convert time **up** to 2 units above or below given unit (e.g., seconds to hours).

M8.B.1.1.4 Convert from Fahrenheit to Celsius or Celsius to Fahrenheit (formulas provided on the reference sheet).

EXAMPLE ITEMS

- 1 mile = 5,280 feet
How many feet are in 15 miles?

- A. 352
- B. 35,200
- * C. 79,200
- D. 84,480
- E. 89,760

(NAEP)

- How many yards are equal to 72 inches?

- * A. 2 yards
- B. 3 yards
- C. 6 yards
- D. 36 yards

(Pennsylvania Department of Education)

- Greg is 150 centimeters tall. How many meters is that?

- A. 0.500
- * B. 1.5
- C. 15
- D. 15,000

(Connecticut State Department of Education)

ASSESSMENT ANCHOR

M8.B.2 Apply appropriate techniques, tools and formulas to determine measurements.

ELIGIBLE CONTENT

M8.B.2.1 Determine the measurement of a missing side(s) or angle(s) in a polygon.

Reference: 2.3.8.C, 2.9.8.D

Delete Reference: 2.10.8.B

M8.B.2.1.1 Determine the total number of degrees in the interior angles of a polygon (for one angle or total) in 3 - 8 sided figures and/or the number of sides given the angle measurement (formula provided on the reference sheet).

M8.B.2.1.2 Determine the measurement of one interior angle of a regular polygon (3-8 sided polygons, formula provided on the reference sheet).

M8.B.2.1.3 Determine the number of sides of a polygon given the total number of degrees in the interior angles (3-8 sided polygons, formula provided on the reference sheet).

~~**M8.B.2.1.2** Find the missing interior angle measure in a triangle.~~

Assessed at Grade 7.

~~**M8.B.2.1.3** Use proportions to find the missing length of a side in similar figures.~~

Assessed at Grade 7.

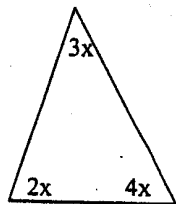
EXAMPLE ITEMS

- In a quadrilateral, each of two angles has a measure of 115° . If the measure of a third angle is 70° , what is the measure of the remaining angle?

- * A. 60°
- B. 70°
- C. 130°
- D. 140°

(TIMSS)

- Find the measure in degrees, of the smallest angle in this triangle?



- A. 20
- * B. 40
- C. 60
- D. 80

(Pennsylvania Department of Education)

M8.B Measurement**Reporting Category****ASSESSMENT ANCHOR**

M8.B.2 Apply appropriate techniques, tools and formulas to determine measurements.

ELIGIBLE CONTENT

M8.B.2.2 Label, measure and/or list properties of angles.

Reference: 2.3.8.C, 2.9.8.B, 2.9.8.E

~~**M8.B.2.2.1** Measure angles up to 180 degrees using a protractor (drawn or provided).~~

Assessed at Grade 7.

~~**M8.B.2.2.2** Define, identify and/or use properties of complementary, supplementary, adjacent or vertical angles.~~

Moved to Geometry C.1.1.2

~~**M8.B.2.2.3** Identify and/or find the measure of corresponding angles, alternate interior angles or alternate exterior angles.~~

Moved to Geometry C.1.1.3

EXAMPLE ITEMS

M8.B Measurement

Reporting Category

ASSESSMENT ANCHOR

M8.B.2 Apply appropriate techniques, tools and formulas to determine measurements.

ELIGIBLE CONTENT

M8.B.2.3 Use, describe and/or develop procedures to determine measures of perimeter, circumference, area, surface area and/or volume.

Reference: 2.3.8.A, 2.3.8.D

~~M8.B.2.3.1~~ Develop and/or use formulas and procedures to find/determine circumference, perimeter and area of simple figures (triangles, parallelograms, trapezoids, circles) and complex figures (use consistent units).

Assessed at Grade 7.

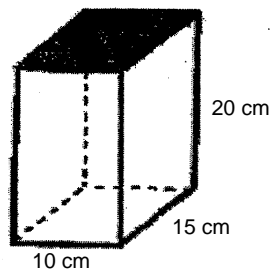
M8.B.2.3.1 Calculate the surface area of cubes and rectangular prisms (formula provided on the reference sheet).

M8B.2.3.2 Calculate the volume of cubes and rectangular prisms, ~~pyramids and cylinders~~ (formulas provided on the reference sheet)

M8.B.2.3.3 Determine the appropriate type of measurement (circumference, perimeter, area, surface area, volume) for a given situation (e.g., which measurement is needed to determine the amount of carpeting for a room).

EXAMPLE ITEMS

- The box pictured below is open at the top. Find its outside surface area.



- A. 28
- B. 35
- * C. 42
- D. 49

(Pennsylvania Department of Education)

M8.B Measurement**Reporting Category****ASSESSMENT ANCHOR****M8.B.2 Apply appropriate techniques, tools and formulas to determine measurements.****ELIGIBLE CONTENT**

~~M8.B.2.4 Construct, interpret and/or use scale drawings to solve real-world problems.~~

~~M8.B.2.4.1 Interpret and/or apply scales shown on maps, blueprints, models, etc.~~

Assessed at Grade 7.

~~M8.B.2.4.2 Determine and/or apply an appropriate scale for reduction or enlargement.~~

Assessed at Grade 7.

EXAMPLE ITEMS

- A model aircraft carrier is built to a scale of 1 inch : 25 feet. If the deck of the model is 43.5 inches long, the actual deck of the carrier would be **approximately** how long?
 - A. 4350 feet
 - * B. 1100 feet
 - C. 435 feet
 - D. 220 feet

(Pennsylvania Department of Education)

M8.B Measurement**Reporting Category****ASSESSMENT ANCHOR****M8.B.2 Apply appropriate techniques, tools and formulas to determine measurements.****ELIGIBLE CONTENT**

M8.B.2.5 Describe how a change in the linear dimension of a figure affects its perimeter, area or volume.

Reference: 2.3.8.E

~~**M8.B.2.5.1** Determine the amount of change in the perimeter, area or volume of a figure when its length(s) is/are increased or decreased (triangles, parallelograms, trapezoids, circles, cubes, rectangular prisms).~~
Assessed at Grade 11.

EXAMPLE ITEMS

- If the perimeter of a square is 4 cm, what will the perimeter be if the length of each side is doubled?
 - A. 64 cm
 - B. 16 cm
 - * C. 8 cm
 - D. 6 cm

(Pennsylvania Department of Education)

ASSESSMENT ANCHOR

M8.C.1 Analyze characteristics and properties of two- and three- dimensional geometric shapes and demonstrate understanding of geometric relationships.

ELIGIBLE CONTENT

M8.C.1.1 Identify, use, and/or describe properties of angles, triangles, quadrilaterals, circles, pyramids, cubes, prisms, spheres, cones and/or cylinders.

Reference: 2.3.8.C, 2.9.8.B, 2.9.8.E, 2.9.8.D

~~**M8.C.1.1.1** Identify and/or describe properties of all types of quadrilaterals (parallelograms, squares, rectangles, trapezoids, rhombi).~~

~~Assessed at Grade 6.~~

~~**M8.C.1.1.2** Identify and/or describe properties of all types of triangles (scalene, equilateral, isosceles, right, acute, obtuse).~~

~~Assessed at Grade 6.~~

~~**M8.C.1.1.3** Identify and/or describe properties of cubes, pyramids, spheres, prisms, cones and cylinders.~~

~~Assessed at Grade 5.~~

M8.C.1.1.1 Match the three-dimensional figure with its net (cube, cylinder, cone, prism, pyramid). Any measurements used should be consistent in the stem and answer choices.

M8.C.1.1.2 Define, identify and/or use properties of angles formed by intersecting lines (complementary, supplementary, adjacent and/or vertical angles).

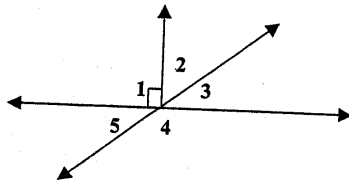
Moved from B.2.2.2.

M8.C.1.1.3 Define, identify and/or use properties of angles formed when two parallel lines are cut by a transversal (alternate interior, alternate exterior, vertical corresponding)

Moved from B.2.2.3.

EXAMPLE ITEMS

- Which angles are complementary?



- * A. $\angle 2$ and $\angle 3$
- B. $\angle 3$ and $\angle 4$
- C. $\angle 4$ and $\angle 5$
- D. $\angle 1$ and $\angle 2$

(Pennsylvania Department of Education)

M8.C Geometry

Reporting Category

ASSESSMENT ANCHOR

M8.C.1 Analyze characteristics and properties of two- and three- dimensional geometric shapes and demonstrate understanding of geometric relationships.

ELIGIBLE CONTENT

M8.C.1.2 Compute measures of sides of right triangles using the Pythagorean Theorem.

Reference: 2.10.8.A

M8.C.1.2.1 Use the Pythagorean Theorem ~~or the Pythagorean Triples~~ to find the measure of a missing side of a right triangle (formula provided on the reference sheet – whole numbers only).

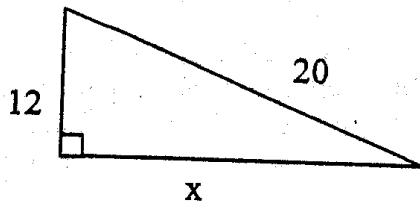
EXAMPLE ITEMS

- Mr. Kyle drives eight miles south and then six miles east. What was the diagonal distance from his starting point?

- A. 2 miles
- * B. 10 miles
- C. 14 miles
- D. 48 miles

(Pennsylvania Department of Education)

- What is the length of the missing side in this triangle?



- A. 14
- B. 15
- * C. 16
- D. 18

(Pennsylvania Department of Education)

ASSESSMENT ANCHOR

M8.C.2 Identify and/or apply concepts of transformations or symmetry.

ELIGIBLE CONTENT

M8.C.2.1 Describe, analyze and/or draw translations, rotations (90, 180 and 360 degrees) and reflections.

Reference: 2.9.8.H

~~M8.C.2.1.1~~ Draw or identify a rotation (turn) about the origin of a 2-dimensional shape on a grid.

~~M8.C.2.1.2~~ Draw or identify a reflection (flip) over the axis of a 2-dimensional shape on a grid.

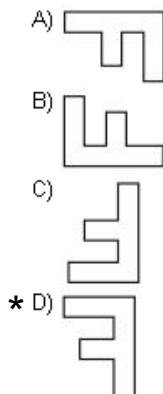
~~M8.C.2.1.3~~ Draw or identify a translation (slide) of a 2-dimensional shape on a grid.

Assessed at lower grades.

EXAMPLE ITEMS

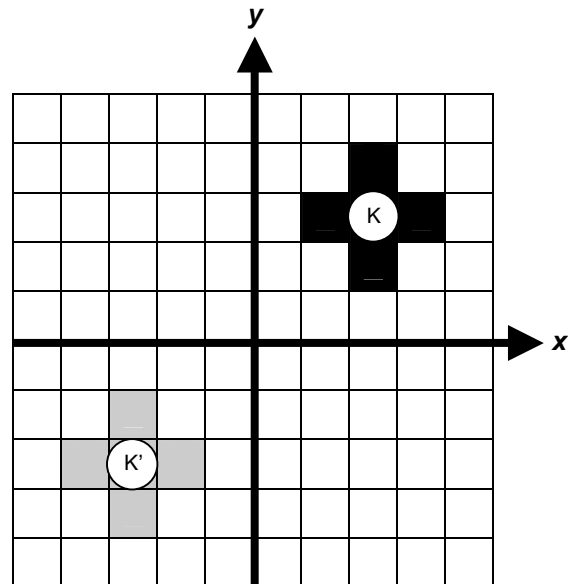


- The figure above is shaded on the top side and white on the under side. If the figure were flipped over, its white side could look like which of the following figures?



(NAEP)

- Figure K' is the result of a sequence of transformations of Figure K. Which of the following does NOT describe a correct possible sequence of transformations?



- A. a translation of Figure K down 5 units, then a translation to the left 5 units
- B. a reflection of Figure K across the x-axis, then a translation to the left 5 units
- * C. a reflection of Figure K across the y-axis, then a translation down 4 units
- D. a reflection of Figure K across the x-axis, then a reflection across the y-axis

(New Jersey Department of Education)

ASSESSMENT ANCHOR

M8.C.3 Locate points or describe relationships using the coordinate plane.

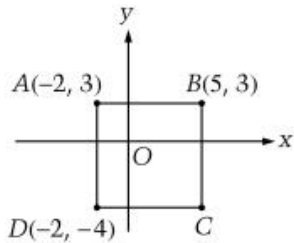
ELIGIBLE CONTENT

M8.C.3.1 Plot and/or identify ordered pairs on a coordinate plane.

Reference: 2.8.5.H

M8.C.3.1.1 Plot, locate or identify ordered pairs on a coordinate plane (the point may be a vertex of a polygon).

EXAMPLE ITEMS



- In the figure above, if ABCD is a square, then the coordinates of vertex C are
 - A. (4,5)
 - B. (3,-4)
 - C. (3,-2)
 - * D. (5,-4)
 - E. (5,-2)

(NAEP)

M8.D Algebraic Concepts

Reporting Category

ASSESSMENT ANCHOR

M8.D.1 Demonstrate an understanding of patterns, relations and functions.

ELIGIBLE CONTENT

M8.D.1.1 Analyze, extend or develop descriptions of patterns or functions.

Reference: 2.8.8.B, 2.8.8.G, 2.11.8.C

M8.D.1.1.1 Continue a numeric or algebraic pattern ~~that could be extended infinitely~~ (pattern must show 3 repetitions – may include up to 2 operations, squares and square roots).

M8.D.1.1.2 Find missing elements in numeric ~~or geometric or graphic~~ patterns and/or functions (may be given a table or rule – pattern must show 3 repetitions).

M8.D.1.1.3 ~~Determine~~ the rule of a function (given elements in an input-output table, chart or list – ~~limit to linear functions~~).

EXAMPLE ITEMS

- The table shows a relation between x and y.

| | | | | |
|---|---|----|----|----|
| x | 2 | 3 | 4 | 5 |
| y | 7 | 10 | 13 | 16 |

Which of these equations expresses this relation?

- A. $y = x + 5$
- B. $y = x \pm 5$
- C. $y = \frac{1}{3}(x \pm 1)$
- * D. $y = 3x + 1$

(Pennsylvania Department of Education)

- What is the next number in the pattern?

4, 13, 28, 49, ...

- A. 58
- B. 64
- * C. 76
- D. 98

(Pennsylvania Department of Education)

- | x | y |
|---|----|
| 0 | -3 |
| 1 | -1 |
| 2 | 1 |

Which of the following equations is true for the three pairs of x and y values in the table above?

- A. $3x + 2 = y$
- B. $3x - 2 = y$
- C. $2x + 3 = y$
- * D. $2x - 3 = y$
- E. $x - 3 = y$

(NAEP)

- List the next two values in this sequence:

4, 10, 22, __, __

- A. 34, 46
- B. 34, 48
- C. 40, 62
- * D. 46, 94

(Pennsylvania Department of Education)

M8.D Algebraic Concepts

Reporting Category

ASSESSMENT ANCHOR

M8.D.2 Represent and/or analyze mathematical situations using numbers, symbols, words, tables and/or graphs.

ELIGIBLE CONTENT

M8.D.2.1 Select and/or use a strategy to simplify an expression, solve an equation or inequality and/or check the solution for accuracy.

Reference: 2.8.8.C, 2.8.8.E

M8.D.2.1.1 Solve one- or two-step equations and inequalities (should not include absolute values – one variable only).

M8.D.2.1.2 Use substitution to check the accuracy of a given value for an equation or inequality (simple inequalities with one variable).

M8.D.2.1.3 Determine the value of an algebraic expression by simplifying and/or substituting a **number** for the variable.

EXAMPLE ITEMS

- If $4x - 6 = 14$, what is the value of x ?
 - A. 1
 - B. 2
 - C. 4
 - * D. 5

(Pennsylvania Department of Education)

- For which equation is $(4, 3)$ a solution?
 - A. $x - y = 7$
 - * B. $x + y = 7$
 - C. $x = y = 1$
 - D. $x + y = 12$

(Pennsylvania Department of Education)

- If k can be replaced by any number, how many different values can the expression $k + 6$ have?
 - A. None
 - B. One
 - C. Six
 - D. Seven
 - * E. Infinitely many

(NAEP)

- $\frac{x}{2} < 7$ is equivalent to
 - A. $x < \frac{7}{2}$
 - B. $x < 5$
 - * C. $x < 14$
 - D. $x > 5$
 - E. $x > 14$

(TIMSS)

M8.D Algebraic Concepts

Reporting Category

ASSESSMENT ANCHOR

M8.D.2 Represent and/or analyze mathematical situations using numbers, symbols, words, tables and/or graphs.

ELIGIBLE CONTENT

M8.D.2.2 Create and/or interpret expressions, equations or inequalities that model problem situations.

Reference: 2.8.8.C

M8.D.2.2.1 Match a written situation to its numeric and/or algebraic expression, equation or inequality (up to two variables in equations or expressions – one variable with inequalities).

M8.D.2.2.2 Write and/or solve an equation for a given problem situation (one variable only).

EXAMPLE ITEMS

- Which equation shows that the sum of x and 2 is twice as much as 6?
 - A. $x = 2 \cdot 2 \cdot 6$
 - B. $x + 2 \cdot 2 = 6$
 - C. $2(x + 2) = 6$
 - * D. $x + 2 = 2 \cdot 6$

(Pennsylvania Department of Education)

- A wooden box with 8 videocassettes inside weighs 4.2 kilograms. The box weighs 0.6 kg when empty. Using w to represent the weight of one videocassette, which of the following describes this situation?
 - A. $8w = 4.2$
 - * B. $8w + 0.6 = 4.2$
 - C. $8w - 0.6 = 4.2$
 - D. $8(w + 0.6) = 4.2$

(New Jersey Department of Education)

- Which of the following equations gives the rule for finding the numbers in the column on the right?

| x | y |
|-----|-----|
| 1 | 7 |
| 2 | 11 |
| 3 | 15 |

- A. $y = x + 4$
- B. $y = 2x + 5$
- C. $y = x + 6$
- * D. $y = 4x + 3$

(New Jersey Department of Education)

M8.D Algebraic Concepts

Reporting Category

ASSESSMENT ANCHOR

M8.D.3 Analyze change in various contexts.

ELIGIBLE CONTENT

Not assessed at grade 8.

EXAMPLE ITEMS

ASSESSMENT ANCHOR

M8.D.4 Describe or use models to represent quantitative relationships.

ELIGIBLE CONTENT

M8.D.4.1 Represent relationships with tables or graphs on the coordinate plane.

Reference: 2.8.8.C, 2.8.8.H

M8.D.4.1.1 Graph a linear function based on an x/y table (integers only).

M8.D.4.1.2 Match the graph of a linear function to its x/y table (integers only).

~~**M8.D.4.1.3** Match an inequality to its graph on a number line (integers only).~~

M8.D.4.1.4 Match the linear equation ($y = mx + b$ form) to the x/y table (integers only in the table).

EXAMPLE ITEMS

- Given the function $y = \frac{1}{2}x - 2$, which set of numbers completes the table?

| x | y |
|----|---|
| -4 | |
| -2 | |
| 0 | |

- A. { 4, 3, 2}
- * B. {-4, -3, -2}
- C. {-4, 3, 2}
- D. { 4, 3, 2}

(Pennsylvania Department of Education)

M8.E Data Analysis and Probability

Reporting Category

ASSESSMENT ANCHOR

M8.E.1 Formulate or answer questions that can be addressed with data and/or organize, display, interpret or analyze data.

ELIGIBLE CONTENT

M8.E.1.1 Choose, display or interpret data (tables, charts, graphs, etc.).
Reference: 2.6.5.A, 2.6.8.E, 2.7.8.D, 2.6.3.B

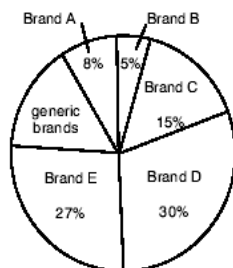
M8.E.1.1.1 Choose **and/or explain** the correct representation (**graph**) for a set of data.

M8.E.1.1.2 **Analyze data and/or answer questions pertaining to data shown in bar/double bar graphs, multiple line graphs, circle graphs or histograms.**

M8.E.1.1.3 Interpret data shown in stem-and-leaf or box-and-whisker plots.

EXAMPLE ITEMS

- According to the graph, what percent of the students chose generic brands?



Favorite Sneakers at Sherman High School

- * A. 15%
- B. 14%
- C. 17%
- D. 16%

(Pennsylvania Department of Education)

- The table below shows test scores for a class. How many students scored in the 80's?

| Stem | Leaf |
|------|---------------|
| 9 | 0 1 1 5 7 |
| 8 | 0 0 2 4 6 7 9 |
| 7 | 7 7 8 9 |
| 6 | 9 |
| 5 | 2 3 |
| 4 | 4 |

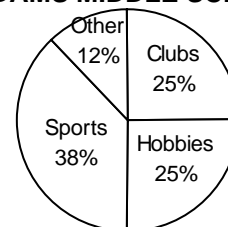
- A. 2 students
- B. 6 students
- * C. 7 students
- D. 9 students

(Pennsylvania Department of Education)

- There are 1,200 students enrolled in Adams Middle School. According to the graph, how many of these students participate in sports?

- A. 380
- * B. 456
- C. 760
- D. 820
- E. 1,162

STUDENT PARTICIPATION IN ACTIVITIES AT ADAMS MIDDLE SCHOOL



(NAEP)

M8.E Data Analysis and Probability

Reporting Category

ASSESSMENT ANCHOR

M8.E.2 Select and/or use appropriate statistical methods to analyze data.

ELIGIBLE CONTENT

M8.E.2.1 Describe, compare and/or contrast different plots of data using measures of central tendency.

Reference: 2.6.8.A

~~**M8.E.2.1.1** Determine the mean (average), median, mode or range and/or quartiles of a set of data.~~

Assessed at Grade 7.

~~**M8.E.2.1.2** Choose which measure of central tendency is appropriate for a given situation.~~

Assessed at Grade 7.

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)

M8.E Data Analysis and Probability

Reporting Category

ASSESSMENT ANCHOR

M8.E.3 Understand and/or apply basic concepts of probability or outcomes.

ELIGIBLE CONTENT

M8.E.3.1 Calculate the probability of an event.

Reference: 2.7.8.E

M8.E.3.1.1 Find the probability for a mutually exclusive or an independent event (written as a fraction in simplest form).

EXAMPLE ITEMS

- There are 15 girls and 11 boys in a mathematics class. If a student is selected at random to run an errand, what is the probability that a boy will be selected?

A. $\frac{4}{26}$ * B. $\frac{11}{26}$ C. $\frac{15}{26}$ D. $\frac{11}{15}$ E. $\frac{15}{11}$

(NAEP)

- There are 9 packages, 5 red and 4 green. There are calculators inside 4 of the red packages and inside 2 of the green packages. What is the probability of choosing a package containing a calculator from the entire group of packages?

- A. $\frac{4}{5}$
 * B. $\frac{2}{3}$
 C. $\frac{1}{2}$
 D. $\frac{4}{9}$

(Pennsylvania Department of Education)

- Jan entered a drawing for a dirt bike 5 times. Only 150 entries were received. What is the probability that Jan will win the dirt bike?

- A. $\frac{1}{150}$
 B. $\frac{1}{50}$
 * C. $\frac{1}{30}$
 D. $\frac{1}{5}$

(Pennsylvania Department of Education)

ASSESSMENT ANCHOR

M8.E.3 Understand and/or apply basic concepts of probability or outcomes.

ELIGIBLE CONTENT

M8.E.3.2 Determine the number of combinations and/or permutations for an event.

*Reference: 2.7.8.A*M8.E.3.2.1 **Determine**/show the number of permutations and/or combinations for an event using up to four choices (e.g., organized list, etc.).

EXAMPLE ITEMS

- Sarah and Tom belong to a soccer league that has 8 teams. Each team will play all of the other teams twice. How many games will be played in all?

- A. 16
- B. 28
- * C. 56
- D. 64

(Colorado Department of Education)

- Edward conducts a simulation using a coin, a number cube, and a spinner as shown below.



What is the number of outcomes for this simulation?

- A. 3
- B. 8
- C. 12
- * D. 48

(Maryland State Department of Education)

M8.E Data Analysis and Probability

Reporting Category

ASSESSMENT ANCHOR

M8.E.4 Develop and/or evaluate inferences and predictions or draw conclusions based on data or data displays.

ELIGIBLE CONTENT

M8.E.4.1 Draw conclusions, make inferences and/or evaluate hypotheses based on statistical and data displays.

Reference: 2.6.8.C, 2.7.8.E

M8.E.4.1.1 Fit a line to a scatter plot and/or describe any correlation between the two variables (positive, negative, strong, weak or none).

M8.E.4.1.2 Make predictions based on survey results or graphs (bar, line, circle, scatterplots, etc.).

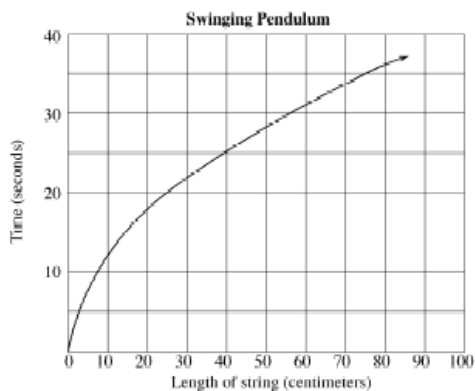
EXAMPLE ITEMS

- From a batch of 3000 light bulbs, 100 were selected at random and tested. If 5 of the light bulbs in the sample were found to be defective, about how many defective light bulbs would be expected in the entire batch?

- A. 15
- B. 60
- * C. 150
- D. 300
- E. 600

(TIMSS)

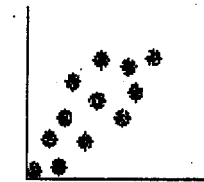
- The graph shows the time taken for a pendulum to swing backwards and forwards 20 times for different lengths of string. The length of a string is 90 cm. About how long would it take for the pendulum to swing backwards and forwards 20 times?



- A. 35 seconds
- * B. 38 seconds
- C. 42 seconds
- D. 45 seconds

(TIMSS)

- Fit a line to the scatter plot of two quantities. Describe any correlation of the variables. The data represented in the scatter plot above can be described as having ...



- * A. Positive correlation
- B. Negative correlation
- C. No correlation
- D. Both positive and negative correlation

(Pennsylvania Department of Education)