PROBLEMS BASED ON THE SPRING 2003
MATHEMATICS STANDARDS AND BENCHMARKS

FOR GRADE 5

WITHOUT EXTRA COMMENTARY

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The purpose of this link from my web-site is to identify a selection of problems aligned with the Minnesota mathematics standards and benchmarks for Grade 5 as adopted in Spring 2003. My focus consists of the standards and benchmarks themselves; the problems here serve to illuminate them. The benchmarks and standards that are particularly relevant for a particular problem are identified in the left-hand margins; for instance, 5-V.C.1 indicates the Grade-5 benchmark V.C.1 and 5-V.C refers to the corresponding standard. In another sense, the focus is the suitability of problems for the Minnesota Comprehensive Assessments (know as MCA's), but in saying this I want to emphasize that the opinions are mine alone, formed without consultation with Minnesota Department of Education. Relevant to the above concerns is a companion link which includes the problems from this link, along with a variety of comments.

I was one of approximately 40 members of the mathematics subcommittee of the Academic Standards Committee, formed by the Minnesota Commissioner of Education in February 2003. I strongly support the mathematics standards and benchmarks resulting from the work of that committee and which, on the basis of a law passed by the Legislature and signed by the Governor, became official in Spring 2003. Although there is no guarantee that this web-site item reflects the thinking within the Department of Education, I have tried very hard to reflect the standards and benchmarks accurately, taking care not to bend them in the direction of my individual views. [Even though I strongly support the standards and benchmarks document, there are places where I would have preferred the document to be a bit different, and I suspect that the same is true (but not for the same places) of every member of the mathematics subcommittee.]

Anticipating that I might want to modify this document from time to time, I have refrained from labeling the problems with numerals and am planning to change the date at the top any time I make additions or changes.

Since the standards are cumulative, all the K-5 benchmarks are relevant for the Grade-5 MCA. It seems to me that it is desirable for Grade-5 teachers to examine all the K-5 benchmarks giving special attention to those for grades 3-5, and in general for teachers to read the standards for a couple grades on either side of the grade they are teaching.

The variety of different problems that are consistent with the standards and benchmarks is very large—that is the power of mathematics; a manageable number of basic principles and techniques enables one to handle a myriad of different situations. So, of course, the problem list that follows cannot be viewed

as comprehensive.

For problems in which students are to place the correct digits in boxes, a decimal point or comma is included between appropriate pairs of boxes when relevant. If the answer requires fewer digits than boxes, it is the left-hand box or boxes which should be left blank. [If the Grade-5 MCA were, in fact, to include such problems it would be important that students become familiar with the instructions some days in advance of the test.]

It is clear from the benchmarks that the Grade-5 MCA should consist mostly of problems for which a calculator should not be permitted. The small latter portion of the problem list below is there in case the state decides that there should also be a 'calculator permitted' portion of the Grade-5 MCA; the place where this latter portion begins is clearly identified with an introductory sentence.

There is not a sharp demarcation separating problems appropriate for various grade levels. For instance, some of the problems described below as appropriate for Grade 5 are also in the link for Grade 4. Typically, a problem that is appropriate for both the Grade-5 MCA and the Grade-4 MCA would be regarded as a more difficult problem for a fourth grader than it would be regarded for fifth graders.

I want to again emphasize: Although the standards and the benchmarks accompanying them constitute an official document of the state of Minnesota, all the judgments about alignment of problems with the benchmarks and standards are mine; neither do they have any official standing nor have they been obtained in consultation with the Minnesota Department of Education. Also, they have not been reviewed by the University of Minnesota where I am a faculty member and, of course, they do not represent any official view of that institution.

4-II.A.2 Which of the following numbers is the second largest among the four numbers?

(a) $143,552,784$
(b) $54,999,333$
(c) $65,400,009$
(d) $973,256$

4-II.A.4
5-I.4
5-I.2

Eileen has bought 19 toy cars during the last 6 months. Each one cost between \$2.95 and \$3.08. She has spent approximately

(a) \$20
(b) \$40
(c) \$60
(d) \$360

FOR GRADE 5, WITHOUT EXTRA COMMENTARY

5-II.A.3 Which of the following fractions equals 75%?

(a) $\frac{3}{4}$
(b) $\frac{4}{5}$
(c) $\frac{7}{5}$
(d) $\frac{7}{4}$

5-V.B.4 The sum of the measures of the angles in a triangle equals

(a) 60°
(b) 90°
(c) 120°
(d) 180°

5-II.A.1 Which of the following numerals represents forty-five and twenty-three thousandths?

(a) 0.4523
(b) 45.0023
(c) 45.023
(d) 45.23

4-V.B.1
5-I.1 How many edges does a tetrahedron have? (Recall that a tetrahedron is a solid having four triangular faces.)

(a) 3
(b) 4
(c) 6
(d) 8

5-V.C.3 Which is correct?

(a) 'Acres' and 'square feet' are both appropriate units for area.

(b) 'Acres' is an appropriate unit for length and 'square feet' is appropriate for area.

(c) 'Acres' is an appropriate unit for area and 'square feet' is appropriate for volume.

(d) 'Acres' is an appropriate unit for time and 'square feet' is appropriate for area.

FOR GRADE 5, WITHOUT EXTRA COMMENTARY

4-III.B.2
5-I.1

Which of the following is correct?

(a) Addition of 0 and multiplication by 0 always give the same result.
(b) Addition of 0 and multiplication by 1 always give the same result.
(c) Addition of 1 and multiplication by 0 always give the same result.
(d) Addition of 1 and multiplication by 1 always give the same result.

5-V.B.1

A pentagonal prism has pentagons on the top and the bottom and five rectangles on the sides. How many edges does it have?

(a) 10
(b) 15
(c) 20
(d) 30

5-V.A.1
5-V.B.3
4-V.B.1

How many reflective symmetries does a regular hexagon have? (Recall that a hexagon is a figure having six edges and six vertices.)

(a) 0
(b) 3
(c) 6
(d) 12

4-II.B.2

Calculate the following sum:

$$\begin{array}{r} 345 \\ +\ 479 \\ +\ 158 \\ \hline \square\square\square \end{array}$$

5-II.B.3

Calculate

$$4.89 - 3.73$$

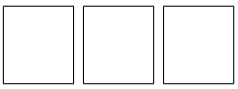
$\square\square . \square\square$

5-II.B.4
5-II.A.4

Calculate

$$\begin{array}{r} 37 \\ \times .79 \end{array}$$

and round your answer to the nearest whole number.

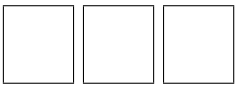


5-II.B.1
5-II.B
5-II.B.3

In one particular year, the precipitation amounts recorded for the city of Buffalo, New York were as follows:

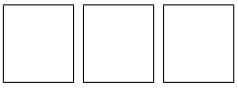
January:	3 inches
February:	2 inches
March:	5 inches
April:	12 inches
May:	10 inches
June:	7 inches
July:	5 inches
August:	5 inches
September:	8 inches
October:	5 inches
November:	5 inches
December:	7 inches

What was the precipitation amount in inches for the entire year?



5-I.2
5-II.B.4
5-II.B.1
3-V.C.5

How many minutes is it from 11:48am to 1:27am of the next day?



FOR GRADE 5, WITHOUT EXTRA COMMENTARY

5-I.5
5-II.B.1
5-II.B.5
5-II.B.3

A pound of cotton has been spun into a thread 8 miles in length. Allowing for 235 pounds of waste, how many pounds will it take to spin a thread to reach around the earth, supposing that distance to be 25,000 miles?

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5-IV.A.2
5-II.B.6
5-II.A.2
5-II.A.3

What percentage of the following numbers are greater than $^{-}3\frac{2}{5}$:

$^{-}7$, 7, $^{-}7/2$, $7/2$, $^{-}3.72$, 3.72, $^{-}3$, 3, $^{-}2/7$, $2/7$?

☐☐

5-IV.A.4
5-I.5
5-II.B.5

During one June, the precipitation amounts in Phoenix, Arizona were 0.4 inches during the first ten days of June, 1.3 inches from June 11 through June 20, and 0.7 inches during the last ten days of the month. Calculate the mean daily rainfall correct to 3 places to the right of the decimal point.

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5-II.B.5

Calculate $58.1 \div 0.07$. *Hint:* The answer is a whole number.

☐☐☐☐☐

5-II.B.5
5-I.5
5-I.2
5-II.B.1

Points A and B are 12 miles apart. John bicycles from A to B at an average speed of 6 miles per hour and returns from B to A at an average speed of 4 miles per hour. What is John's average speed in miles per hour for the round trip: A to B and back to A? Write your answer as either a whole number or as a decimal, whichever is appropriate.

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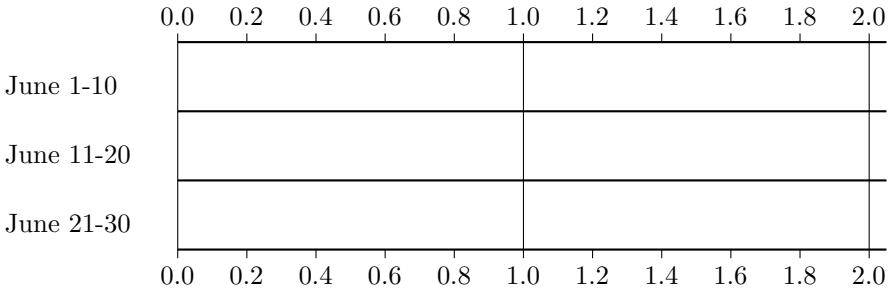
4-II.A.3
4-IV.A.1

During one June, the precipitation amounts in Phoenix, Arizona were 0.4 inches during the first ten days of June, 1.3 inches from June 11 through June 20, and 0.7 inches during the last ten days of the month. Illustrate this data with a bar graph.



4-V.C.2
5-I.6

Sketch pictures of two rectangles each having area 30, but having different perimeters. Indicate the side lengths in your pictures and calculate the perimeters of both rectangles.

FOR GRADE 5, WITHOUT EXTRA COMMENTARY

5-IV.B.1 A deck consisting of four cards labeled A, B, C, and D is shuffled and then the top two cards are drawn in order. Make a list describing the possible outcomes of this experiment.

5-III.A.1
5-I.7 Consider the sequence of numbers

$$2, 7, 22, 67, \ldots$$

Complete the following sentence: In the above sequence the initial term equals 2 and each subsequent term is obtained from the term preceding it by $\cdots$.

Then find the term that comes immediately after 67.

FOR GRADE 5, WITHOUT EXTRA COMMENTARY

I include below some problems which would be appropriate were there to be a **calculator portion of the Grade-5 MCA**.

5-II.A.4
5-II.B

Find

$$(27.314 + 15.337) \times 2.1223\,.$$

The best 5-digit approximation of the answer equals

(a) 59.863
(b) 59.864
(c) 90.518
(d) 90.519

5-I.2
5-I.7
5-V.B.1
4-V.A.1
5-II.B.1

A non-regular octahedron is positioned with one of its eight triangular faces on a floor. That triangular face and its opposite face are congruent equilateral triangles each having perimeter 17.19. The other edges of the octahedron are 1.87 times the length of the edges of the bottom face. Find the total length of all the edges of the octahedron.

The views and opinions expressed in this link are strictly those of Bert Fristedt. The contents have been neither reviewed nor approved by the University of Minnesota.