

Grades 4-9 Competition

The West Virginia State Math Field Day for grades 4-9 consists of 6 events: a written exam, physical estimation (grades 4-8), short answer (grade 9), mental math, estimation computation, a surprise activity, and relays. The surprise activity and relays do not count toward individual scores. See page 7 & 8 for information about breaking ties. See page 10 for more detailed information on scoring. Directions follow for each activity. Questions for each event are written on grade level. Calculators are not permitted on any portion of the grades 4-9 competition- see page 9 of manual.

Written Test

The written test consists of 40 multiple choice questions which involve mathematical problem solving, not just computation. Five choices will be given for each question. Testing time, including instructions, will be one hour. Calculators are not permitted – see page 9 of manual.

Test topics will correspond with the current West Virginia math guidelines for that grade level.

Physical Estimation (Grades 4-8)

There will be 10 stations for each grade level. A station will have a card indicating the measurement which is to be estimated and what unit is to be used in the estimation (i.e., area in square inches). The units will be typed on the answer sheet as well. The student will need to record the numerical part of the estimation using a ball point pen. Students may handle the objects.

Answers may not be changed or crossed out once they have been written. If a cross out or change occurs, those particular answers will be marked incorrect. Evidence of written computation will result in a score of zero for the entire event. Each question will be counted right or wrong – no partial credit will be given. An answer that is within 30% of the exact answer is correct. Otherwise, it is wrong. Thirty seconds will be allowed for each activity after reaching the activity.

One of the ten stations will involve estimating the number of items in a container. One station will involve estimating time in seconds. Occasionally stations may be included which have a measuring instrument or reference unit present that students may use. The remaining eight stations will be some combination of the following: one half (4) of which will use English (customary) units:

Length.....m, cm, in, ft
Area.....cm², m², in², ft²
Volume.....cm³, m³, l, ml, pt, qt, in³
Mass.....g, kg, oz, lb
Temperature.....° C, ° F

The student who guesses closest to the number of items in the container wins the container and contents.

Short Answer (Grade 9)

At the ninth-grade level, short answer questions replace the physical estimation activity.

There will be 8-10 questions. Questions will be given to the participants two at a time with a 10-minute time limit for each group of 2 questions. Calculators are not permitted – see page 9 of manual.

Answers will be placed on special answers sheets with blanks for two answers. Format of answers must follow guidelines for acceptable form of answer in grades 4-9 (See Page 15.)

Grades 4-9 Mental Math Exact Answer

This event consists of ten (10) oral questions and must be done with **no** written computation. All work is to be done mentally. Each problem will be read twice by the proctor. After the question is read twice, twenty seconds will be allowed before going on to the next problem. Exact answers are required. See acceptable forms of answers on Page 15.

Only answers are to be written on the answer sheets. Students are required to use ballpoint pens, which will be provided. Answers may not be changed or crossed out once they have been written. If a cross out or change would occur, those particular answers will be marked incorrect. Evidence of written computation will result in a score of zero for the entire event.

The following objectives will be used in the mental math activity. An objective may be used more than once and not necessarily every objective will be used.

The student will	Samples Grades 4-5	Samples Grades 6-7	Samples Grades 8-9
1. Add/subtract two whole numbers having no more than four digits.	284 + 116 (400) 1000 - 511 (489)	143 - 77 (66) 478 + 622 (1100)	8007 - 4769 (3238) 5002 + 1783 (6785)
2. Add a column of whole numbers	13 + 75 + 37 + 25 (150)	135 + 140 + 91 (366)	8054 + 2000 + 1046 + 500 (11,600)
3. Multiply a three-digit whole number by a one-digit whole number	407 X 6 (2442)	121 X 3 (363)	451 X 6 (2706)
4. Multiply two multiples of ten	60 X 70 (4200)	70 X 120 (8400)	380 X 70 (26,600)
5. Multiply a three-digit whole number by a multiple of ten	not appropriate	not appropriate	508 X 90 (45,720)
6. Divide a whole number by a one-digit divisor	945 ÷ 9 (105)	5607 ÷ 7 (801)	7812 ÷ 6 (1302)
7. Add/subtract fractions with like denominators	7/13 - 3/13 (4/13)	3/10 + 1/10 (2/5)	3/4 + 3/4 (3/2 or 1 1/2)
8. Add/subtract fractions with unlike denominators	1/2 + 1/4 (3/4)	3/5 + 1/3 (14/15)	3/4 + 2/3 (17/12 or 1 5/12)

The student will:	Samples Grades 4-5	Samples Grades 6-7	Samples Grades 8-9
9. Subtract a mixed number or fraction from a whole number	$2 - \frac{3}{5}$ ($1 \frac{2}{5}$ or $7/5$)	$7 - 3 \frac{1}{4}$ ($3 \frac{3}{4}$ or $15/4$)	$9 - 4 \frac{5}{6}$ ($4 \frac{1}{6}$ or $25/6$)
10. Add subtract mixed numbers	not appropriate	not appropriate	$2 \frac{3}{4} + 5 \frac{3}{8}$ ($8 \frac{1}{8}$ or $65/8$)
11. Multiply two fractions	$\frac{2}{3} \times \frac{1}{5}$ ($\frac{2}{15}$)	$\frac{2}{4} \times \frac{1}{4}$ ($\frac{1}{8}$)	$\frac{5}{8} \times \frac{4}{15}$ ($\frac{1}{6}$)
12. Divide fractions	not appropriate	$\frac{2}{3} \div \frac{3}{4}$ ($\frac{8}{9}$)	$\frac{2}{3} \div \frac{5}{6}$ ($\frac{4}{5}$)
13. Divide mixed numbers	not appropriate	not appropriate	$7 \frac{1}{2} \div 1 \frac{7}{8}$ (4)
14. Add/subtract decimal numbers involving tenths	$1.2 + .3$ (1.5 or $1 \frac{1}{2}$ or $3/2$)	$23 + 7.8$ (30.8 or $30 \frac{4}{5}$) (not $30 \frac{8}{10}$)	$14.7 + 3.5$ (18.2 or $18 \frac{1}{5}$) (not $18 \frac{2}{10}$)
15. Multiply/divide a decimal number by a positive power of ten	not appropriate	9.5×1000 (9500) $6.8 \div 100$ (.068)	$13.7 \times 100,000$ (1,370,000) $7.65 \div 10,000$ (.000765)
16. Multiply a decimal number by a multiple of ten	not appropriate	not appropriate	7.9×20 (158)
17. Find the percent of a number	not appropriate	50% of 932 (466) 33 $\frac{1}{3}$ % of 168 (56)	83 $\frac{1}{3}$ % of 7818 (6515) 62 $\frac{1}{2}$ % of 16 (10)
18. Add/subtract integers	not appropriate	$-17 + 8$ (-9) $6 - (-5)$ (11)	$25 + -5$ (20) $-6 - (-5)$ (-1)
19. Find the standard numeral for a power of a one-digit whole number	not appropriate	4^3 (64)	3^6 (729)
20. Perform a series of operations	$2400 \div 30 - 40$ (40)	$563 + 437 - 195$ (805)	$360 \div 72 + 21$ (26) $5^3 \times 2^3 - 6^0$ (999) $(9.5 + 5) \div .1$ (145)

Grades 4-9 Mental Math Estimation Computation

This activity consists of ten written questions to be completed mentally – **NO** written computation is permitted. All work is to be done mentally. Each problem will be displayed for students to see for 20 seconds. Only approximate answers are expected. Credit will be given for each answer that is within 10% of the exact answer. See acceptable forms of answers on Page 15.

Only answers are to be written on the answer sheet. Units not required. Students are required to use ball point pens, which will be provided. Answers may not be changed or crossed out once they have been written. If a cross out or change would occur, those particular answers will be marked incorrect. Evidence of written computation will result in a score of zero for the entire event.

The following objectives will be used for the mental math estimation computation. An objective may be used more than once and not necessarily every objective will be used.

The student will:	Samples Grades 4-5	Samples Grades 6-7	Samples Grades 8-9
1. Add/subtract whole numbers	3514 - 1896 (1456.2 ≤ <u>1618</u> ≤ 1779.8) 79 + 327 + 486 (802.8 ≤ <u>892</u> ≤ 981.2)	23,602 - 15,887 (6943.5 ≤ <u>7715</u> ≤ 8486.5) 769 + 886 + 795 (2205 ≤ <u>2450</u> ≤ 2695)	8879 + 7365 + 967 (15489.9 ≤ <u>17211</u> ≤ 18932.1) 379,431 - 107,614 (244,635.3 ≤ <u>271,817</u> ≤ 298,998.7)
2. Multiply/divide whole numbers	26 X 92 (2152.8 ≤ <u>2392</u> ≤ 2631.2) 7105 ÷ 96 (66.61 ≤ <u>74 1/96</u> ≤ 81.41)	6893 ÷ 348 (17.83 ≤ <u>19 R281</u> ≤ 21.79) 832 X 25 (18,720 ≤ <u>20,800</u> ≤ 22,880)	22,486 ÷ 748 (27.06 ≤ <u>30 R46</u> ≤ 33.07) 946 X 43 (36,610.2 ≤ <u>40,678</u> ≤ 44,745.8)
3. Add/subtract fractions	1/3 + 1/4 + 7/12 (1.05 ≤ <u>7/6</u> ≤ 1.283) 7/8 - 1/6 (.6375 ≤ <u>17/24</u> ≤ .779)	2/3 + 3/4 + 7/8 (2.06 ≤ <u>55/24</u> ≤ 2.52) 21/22 - 1/2 (.409 ≤ <u>5/11</u> ≤ .5)	1/2 + 2/3 + 5/6 + 7/8 (2.5875 ≤ <u>2 7/8</u> ≤ 3.1625) 4/7 - 1/4 (.289 ≤ <u>9/28</u> ≤ .354)
4. Multiply/divide fractions	1/2 of 9175 (4128.75 ≤ <u>4587.5</u> ≤ 5046.25) 7/8 ÷ 1/2 (1.575 ≤ <u>7/4</u> ≤ 1.925)	7/9 of 109 (76.3 ≤ <u>84 7/9</u> ≤ 93.26) 6/7 ÷ 3 (.257 ≤ <u>2/7</u> ≤ .314)	7/12 of 1440 (756 ≤ <u>840</u> ≤ 924) 7/8 ÷ 3/4 (1.05 ≤ <u>7/6</u> ≤ 1.283)
5. Add/subtract mixed numbers	1 1/4 + 3 1/2 (4.275 ≤ <u>4 3/4</u> ≤ 5.225)	1 7/8 + 1 8/9 (3.3875 ≤ <u>3 55/72</u> ≤ 4.140)	1 1/2 + 2 3/4 + 7 1/3 (10.425 ≤ <u>11 7/12</u> ≤ 12 .742)
6. Multiply/divide mixed numbers	3 3/4 X 85 (286.875 ≤ <u>318 3/4</u> ≤ 350.625)	5 5/6 X 96 (504 ≤ <u>560</u> ≤ 616)	26 ÷ 1 1/4 (18.72 ≤ <u>20 4/5</u> ≤ 22.88)
7. Add/subtract decimal numbers	4.5 - 1.76 (2.466 ≤ <u>2.74</u> ≤ 3.014)	95.2 + 46.7 + 13.5 (139.86 ≤ <u>155.4</u> ≤ 170.94)	14.7 + 20.22 + 94.8 + 10.97 (126.621 ≤ <u>140.69</u> ≤ 154.759)
8. Multiply/divide decimal numbers	not appropriate	3.7 X 94 (313.02 ≤ <u>347.8</u> ≤ 382.58) 30 ÷ 4.8 (5.625 ≤ <u>6.25</u> ≤ 6.875)	8.98 X .6 (4.8492 ≤ <u>5.388</u> ≤ 5.9268) 48.5 ÷ .2 (218.25 ≤ <u>242.5</u> ≤ 266.75)

The student will:	Samples Grades 4-5	Samples Grades 6-7	Samples Grades 8-9
9. Find a percent of a number	not appropriate	25% of 183 (41.175 ≤ <u>45.75</u> ≤ 50.325)	62 ½ % of 9.584 (5.391 ≤ <u>5.99</u> ≤ 6.589)
10. Add/subtract/multiply/divide integers	not appropriate	-40 ÷ -5 (7.2 ≤ <u>8</u> ≤ 8.8) -200 + -85 (-313.5 ≤ <u>-285</u> ≤ -256.5)	-85 X -85 (6502.5 ≤ <u>7225</u> ≤ 7947.5) -46 + 16 (-27 ≤ <u>-30</u> ≤ -33)
11. Perform a series of operations	387 + 965 - 223 (1016.1 ≤ <u>1129</u> ≤ 1241.9) 89 X 3 - 100 (150.3 ≤ <u>167</u> ≤ 183.7)	8.7 + 3.9 - 5 (6.84 ≤ <u>7.6</u> ≤ 8.36) (186 + 254) X 75 (29,700 ≤ <u>33,000</u> ≤ 36,300)	8.7 + .78 - 9 (.432 ≤ <u>.48</u> ≤ .528) 5 ⁴ - 7 ³ (253.8 ≤ <u>282</u> ≤ 310.2)
12. Find the square root of a number	not appropriate	√65536 (230.4 ≤ <u>256</u> ≤ 281.6)	√.6084 (.702 ≤ <u>.78</u> ≤ .858)
13. Find the perimeter of a polygon given the length of a side.	What is the perimeter of a square with 9" sides? (32.4 ≤ <u>36</u> ≤ 39.6)	What is the perimeter of a rectangle with length of 11" and width of 6" ? (30.6 ≤ <u>34</u> ≤ 37.4)	What is the perimeter of a regular pentagon with 13" sides? (58.5 ≤ <u>65</u> ≤ 71.5)
14. Find the circumference of a circle	not appropriate	What is the circumference of a circle with 11" diameter? (31.10 ≤ <u>34.56</u> ≤ 38.01)	What is the circumference of a circle with a radius of 15" ? (84.82 ≤ <u>94.25</u> ≤ 103.67)
15. Find the area of a rectangle or circle	<u>Rectangle only.</u> Find the area of a rectangle with length of 8" and width of 5". (36 ≤ <u>40</u> ≤ 44)	Find the area of a rectangle with length of 15" and width of 5". (67.5 ≤ <u>75</u> ≤ 82.5)	Find the area of a circle with a 4" radius. (45.24 ≤ <u>50.27</u> ≤ 55.29)