Appalachian Rural Systemic Initiative

Diagnostic Mathematics Tests

This material was developed by
Dr. Ron Pelfrey
For the
Appalachian Rural Systemic Initiative
200 East Vine St., Ste. 420
Lexington, KY 40507
http://www.arsi.org/

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Instructions

The Diagnostic Mathematics Tests were designed to be end-of-the-year tests to assess how well students at the respective grade levels understood and could apply content that they would be expected to master. Each of the items is correlated to major content indicators that should be taught during the specified grade level. In order to fairly determine understanding, however, most of the test items are written at a level of difficulty that is higher than commonly found in many textbooks. Mastery tests normally require 3 or more items per concept in order to assign mastery. In order to shorten this test to a reasonable time, the decision was made to make this a diagnostic test rather than a mastery test, i.e., responses should give some indication of whether a student has understanding of a concept or skill, but it does not assure mastery – the items will provide some indication of skills/concepts a student does not know, but should.

These tests can also be used as pre-tests with the understanding that few students would be expected to perform well on most items. If, however, there were items on which most students were successful, then that topic could be eliminated (other than possible review) from the instructional sequence for that year. Any students who did not demonstrate mastery on these topics could receive instruction individually in class or in Extended School Service programs.

As with the CATS tests, there is no set time limit with these tests. As long as students are working and making satisfactory progress, they should be allowed to continue completing the test. The administration of the End-of-Primary Test is different. It is expected that the teacher read this test to the students, pausing after each question has been read twice to allow all students to indicate that they have completed the question (or decided to skip it) before proceeding. Teachers can develop various methods for students to be able to provide this indication (pencils down, eyes toward the teacher, cup turned over, etc.)

The Fourth, Fifth, Sixth Grade and Pre-Algebra Diagnostic Mathematics Tests can either be answered on scannable answer sheets or the answers can be circled on the test packet. The End-of-Primary Test is to be answered on the test form. Before beginning each test, the teacher should model how to ”bubble in” the circle on the End-of-Primary Test or on the scannable answer sheets if they are used in the other grade levels. In addition, all tests require some of the answers be written and scored using a rubric. It is suggested that a blank sheet of paper be provided to students in grades 4-7 to answer these specific questions. The teacher administering the test needs to model how to provide the answers to these types of questions, i.e., number the response according to the problem number, label any drawings, tables, or graphs according to the appropriate problem number, etc.

For the purposes of this test, calculators should not be used.

Special Instructions Specific to the First Grade Diagnostic Mathematics Test

Directions to Teacher:

This is a "power" test, i.e., it is not a timed test. Teachers need to dictate the test – allowing time for all students to answer each question before proceeding. The test items include only those objectives that the students should have had practice with, i.e., those skills/concepts at the Practice or Mastery Level. The objective is to determine which of these first grade skills/concepts the students show understanding versus which need continued development.

The solutions to the problems are correlated to Core Content for Assessment – Grade 5, Version 3.0. The problems are representative of the skills/concepts with which first grade students should have had practice – and many that they should have mastered – as prerequisites for the related fifth grade assessed objectives.

First Grade Diagnostic Mathematics Test

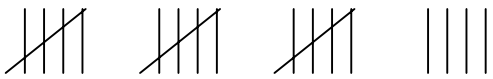
Directions: Shade in the circle below the correct answer.

1. Look at the calendar below. On what day of the week is the 20th ?

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

A	B	C	D
Sunday	Monday	Thursday	Friday
O	O	O	O

2. Count the tally marks. How many tally marks are there?



A	B	C	D
16	34	7	19
O	O	O	O

Below is part of a number chart. Use it to answer questions 3 – 5.

21	22	23	24	25	26	27	28	29	♥
◆	32	33	34	35	36	37	38	39	40
41	42	43	●	45	46	47	48	49	50

3. What number should replace the ●?

A	B	C	D
30	31	44	None of these
O	O	O	O

4. What number should replace the ◆?

A	B	C	D
30	31	44	None of these
O	O	O	O

5. What number should replace the ♥?

A	B	C	D
30	31	44	None of these
O	O	O	O

6. Which figure below is half-shaded?

A	B	C	D
			
O	O	O	O

7. Which of the following has a sum of 9?			
A 3 + 6 O	B 7 + 3 O	C 1 + 7 O	D 4 + 3 O

8. Sharon counted six blue balls and eight red balls. Which number sentence shows how many she counted in all?			
A 8 – 6 = 2 O	B 6 + 8 = 14 O	C 6 + 2 = 8 O	D None of these O

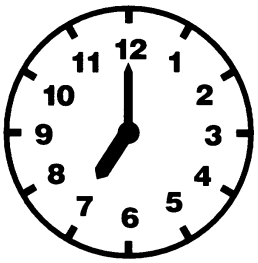
9. Which day of the week comes right after Tuesday?			
A Monday O	B Sunday O	C Thursday O	D None of these O

10.

$$\begin{array}{r} 10 \\ -\ 8 \\ \hline \end{array}$$ is:

A	B	C	D
4	3	2	8
O	O	O	O

11. What time is shown on this clock face?



A	B	C	D
8 o'clock	7 o'clock	12 o'clock	Half past 7
O	O	O	O

12.

$$\begin{array}{r} 2 \\ +7 \\ \hline \end{array}$$?

A	B	C	D
9	10	11	8
O	O	O	O

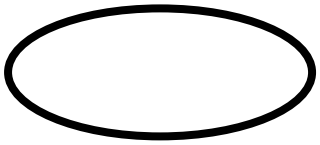
13. What are the next three numbers in this pattern?			
26, 27, 28, ___, ___, ___			
A 28, 29, 30 O	B 30, 31, 32 O	C 25, 24, 23 O	D 29, 30, 31 O

14. What are the next three numbers in this pattern?			
14, 16, 18, ___, ___, ___			
A 19, 21, 23 O	B 20, 22, 24 O	C 19, 20, 21 O	D 20, 21, 22 O

15. What are the next three numbers in this pattern?			
20, 19, 18, ___, ___, ___			
A 19, 20, 21 O	B 20, 22, 24 O	C 17, 16, 15 O	D 10, 9, 8 O

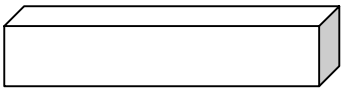
16. James found five pennies yesterday. He found four more today. How many pennies does he have now?			
A 54 pennies O	B 9 pennies O	C 8 pennies O	D 10 pennies O

17. Billy put a toy on a sheet of paper. He then drew around it. Which shape did he draw?



A	B	C	D
Circle	Square	Rectangle	Oval
O	O	O	O

18. Which shape is a side of this box?



A	B	C	D
Diamond	Oval	Rectangle	Triangle
O	O	O	O

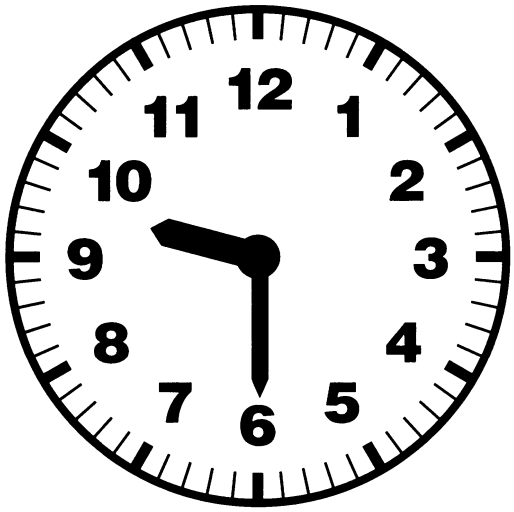
19. How many pennies equal one nickel?

A	B	C	D
5	10	25	1
O	O	O	O

20. One quarter is equal to how many pennies?

A	B	C	D
5	10	25	1
O	O	O	O

21. What time is shown on this clock face?



A	B	C	D
8:30	9:30	6:30	6:10
O	O	O	O

22. Which number below is the number eighty-six?

A	B	C	D
68	806	86	None of these
O	O	O	O

23. Each of these boxes has three numbers. Which box has only odd numbers?

A	B	C	D
5, 9, 13	4, 8, 12	1, 2, 3	10, 30, 50
O	O	O	O

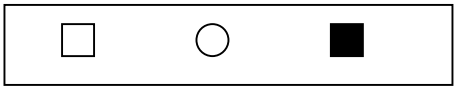
24. Which number is one less than 79?			
A 77 O	B 80 O	C 78 O	D 69 O

25. Eric has one dime and three pennies. Jennifer has three nickels. Robin has one quarter. Who has more?		
A Eric O	B Jennifer O	C Robin O

26. Which symbol goes in the box to make this a true statement? 17 ☐ 23			
A > O	B < O	C = O	D → O

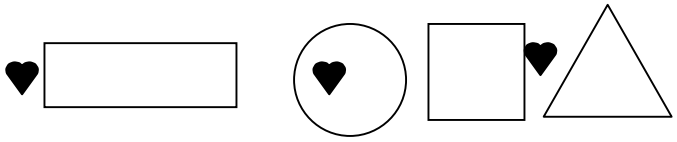
27. Subtract 17 – 9.			
A 12 O	B 8 O	C 26 O	D Not here O

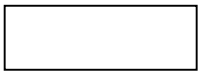
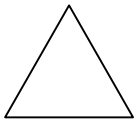
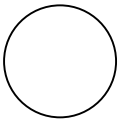
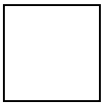
28. Which shape should go in the box with the others?



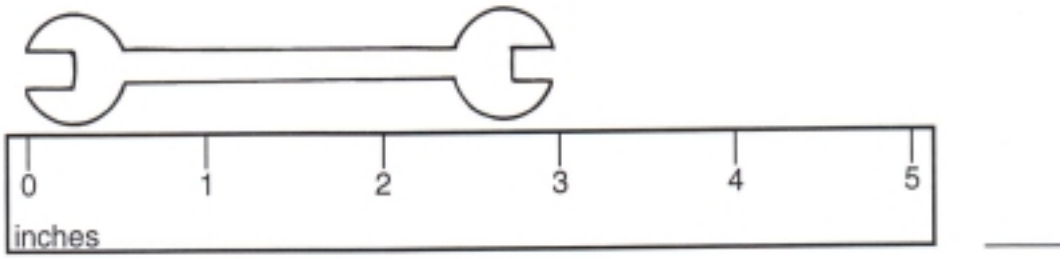
A	B	C	D
 O	 O	 O	 O

29. A ♥ is **inside** which shape?



A	B	C	D
 O	 O	 O	 O

30. How many inches long is this object?



A	B	C	D
0	1	3	5
O	O	O	O

Solutions to First Grade Diagnostic Mathematics Test

1. C Thursday — (E-2.2.6) *Calendar* [If the student selected a different answer, either s/he did not recognize the relationship between the number, 20, and the ordinal number, 20^{th}; or the student cannot read a calendar/chart.]

2. D 19 — (E-3.2.3) *Interpret data* [If the student answered 16, s/he recognized only four groups of 4; if the student selected 34, s/he thought the tally groups represented ten; if the student chose 7, s/he saw each group as one whole and then added four more to this for a total of 7.]

[Questions 3 – 6, if the students selected different answers from those which were correct, s/he is unable to read a place value chart and unable to recognize number patterns.]

3. C 44 — (E-1.1.4) *Place value*

4. B 31 — (E-1.1.4) *Place value*

5. A 30 — (E-1.1.4) *Place value*

6. B  — (E-1.1.1) *Concept of fraction* [If the student selected a different result, s/he does not understand "half."]

7. A
$$\begin{array}{r} 3 \\ +\,6 \\ \hline \end{array}$$
(E-1.1.2) *Add whole numbers* [If the student made a different choice, does not know this basic fact.]

8. B 6 + 8 = 14 — (E-4.2.3) *Number sentences* [If the student made a different choice, s/he cannot translate from a verbal statement to a number sentence; or, does not understand the phrase "in all."]

9. D None of these (Wednesday) — (E-2.2.6) *Calendar* [If the student was incorrect, s/he does not know the days of the week in order.]

10. C 2 — (E-1.2.2) *Subtract whole numbers* [If incorrect, the student does not know the basic fact.]

11. B Seven o'clock — (E-2.2.6) *Time to the hour*

12. A 9 — (E-1.1.2) *Add whole numbers*

13. D 29, 30, 31	(E-4.2.1) *Extend number patterns* [If the student selected 28, 29, 30, s/he has difficulty with counting on patterns; if the student selected 30, 31, 32, s/he may not know how to count on with larger numbers; if the student answered 25, 24, 23, s/he failed to recognize the pattern and counted backwards.]
14. B 20, 22, 24	(E-4.2.1) *Extend number patterns; skip counting* [If the student selected 19, 21, 23, s/he recognized that the numbers differed by two, but did not recognize they were all even; if the student selected 19,20, 21, s/he counted on from 18 without recognizing that the pattern was every other number – the even numbers; if the student selected 20, 21, 22, s/he recognized that the next even number was 20, but failed to continue the pattern of evens.]
15. C 17, 16, 15	(E-4.2.1) *Extend number patterns; count backwards from 20* [If the student selected 19, 20, 21, s/he continued counting on from 18 without recognizing that the pattern was counting backwards; if the student chose 20, 22, 24, s/he perceived the pattern to be even numbers from 18; if the student picked 10, 9, 8, s/he recognized that the pattern was counting backwards, but did not continue on from 18.]
16. B 9 pennies	(E-1.2.2) *Add whole numbers* [If the student selected 54, s/he does not understand place value; if the student selected 8 pennies or 10 pennies, s/he missed the addition fact.]
17. D Oval	(E-2.1.2) *Basic 2-dimensional shapes* [If incorrect, the student can recognize neither an oval or the answer selected.]
18. C Rectangle	(E-2.1.2) *Basic 2-dimensional shapes* [If incorrect, the student can recognize neither a rectangle – in the context of a 3-dimensional shape – nor the shape s/he identified as the answer.]
19. A 5	(E-2.2.6) *Money* [If incorrect, the student does not know the value of either (or both) a penny or a nickel.]
20. C 25	(E-2.2.6) *Money* [If incorrect, the student does not know the value of either (or both) a quarter or a penny.]
21. B 9:30	(E-2.2.6) *Measure time to the half hour* [If the student selected 6:10, then s/he reads the clock face backwards; if s/he selected 6:30 or 8:30, s/he understands that the hand on

	the six means “thirty” but does not know how to read the rest of the time.]
22. C 86	(E-1.2.1) *Read whole numbers* [If the student selected 68, s/he may be dyslexic and read the digits backwards; if s/he selected 806, s/he does not know place value.]
23. A 5, 9, 13	(E-1.1.3) *Even and odd numbers* [If the student selected 4, 8, 12 or 1, 2, 3, s/he does not understand the concept of odd; if s/he selected 10, 30, 50, she does not know how to interpret the 0’s with the numbers but likely knows the concept of odd.]
24. C 78	(E-1.2.4) *Skip count forward and backward; one less than* [If the student made a different choice, s/he does not know the concept “one less than.”]
25. C Robin	(E-2.2.6) *Money* [If the student was incorrect, either s/he does not know the value of the coins, or – more likely – cannot hold in place a multistep problem or developed a procedure to record the steps.]
26. B <	(E-1.3.1) *Compare and order numbers* [If incorrect, the student does not understand the order symbol.]
27. B 8	(E-1.2.2) *Subtract whole numbers* [If incorrect, the student either does not know the basic fact or does not recognize it when written horizontally.]
28. D ●	(E-2.2.1) *Sort by attributes* [If incorrect, the student is unable to extend patterns of shape and color.]
29. C ○	(E-2.1.1) *Basic geometric elements (spatial relationships)* [If incorrect, the student does not understand the concept of “inside.”]
30. C 3	(E-2.2.5) *Use standard units to measure length* [If incorrect, the student cannot read a ruler.]