Appendix 9.A

Reordered Versions of the CA and OA Instruments

Information lines key: The format for the two lines of information following each item is explained below using a reduced picture of Item C–24 and its information lines as an illustration.

"C–24" means this item had the 24th highest composite score (for all the students who took the item) out of the 60 items on the Concepts Assessment (CA). An "O" preceding the number signifies that the item came from the 35-item Operations Assessment (OA).

"(9)" refers to the original item number, and is the number appearing next to the item question stem.

".750, Grades 4–8, n = 650" gives the composite score for the students who took this item (650 students in Grades 4–8).

The number of respondents for answer choice.

The number of students who did not answer the item.

9. Which picture shows the same fraction as the shaded part of this line segment?

```
Item C–24 (9): .750, Grades 4–8, n = 650. a) 40  b) 23  c) 18  d) 488  e) 69  na) 11
G4-.644 (22/34)  G5-.753 (23/43)  G6-.762 (25/60)  G7-.836 (21/60)  G8-.816 (30/60)
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This item was the 22nd easiest item out of 43 for the fourth graders. It was the 30th easiest out of 60 items for the eighth graders. Note: The 60 items done by the sixth through eighth graders include the 43 items done by the fourth and fifth graders.

64.4% of the fourth graders did this item correctly.
These directions preceded the original CA:

ASSESSMENT OF RATIONAL-NUMBER CONCEPTS

Directions: Read each question and set of answers carefully. Select the choice that you think answers the question. Mark the appropriate space on your answer sheet. If a question does not have the correct answer given, mark space "e" on your answer sheet. If you do not know how to do a problem, leave the answer space blank.

1. What fraction of this circle is shaded?

   ![Fraction Circle]

   a. 2  b. ½  c. 1  d. ¾  e. not given

Item C-1 (1): .975, Grades 4–8, n = 650.
   a) 2  b) 634  c) 5  d) 5  e) 3  na) 1
   G4-.938 (2/43) G5-.975 (1/43) G6-1.00 (1/60) G7-1.00 (1/60) G8-.981 (4/60)

17. Which fraction says "two-fourths"?
   a. 6  b. 24%  c. 8  d. ¾  e. not given

Item C-2 (17): .964, Grades 4–8, n = 650.
   a) 0  b) 5  c) 8  d) 627  e) 8  na) 2
   G4-.957 (1/43) G5-.950 (4/43) G6-.991 (2/60) G7-.959 (8/60) G8-.972 (6/60)

18. Which fraction says ³⁄₅?
   a. five  b. six  c. two-thirds  d. twenty-three percent  e. not given

Item C-3 (18): .958, Grades 4–8, n = 650.
   a) 0  b) 4  c) 623  d) 14  e) 8  na) 1
   G4-.932 (3/43) G5-.950 (4/43) G6-.983 (3/60) G7-.989 (2/60) G8-.954 (9/60)

10. Which fraction says "three-fourths"?
   a. 34  b. ¾  c. 3 ½  d. ¾  e. not given

Item C-4 (10): .955, Grades 4–8, n = 650.
   a) 5  b) 621  c) 7  d) 10  e) 3  na) 4
   G4-.901 (4/43) G5-.950 (4/43) G6-.974 (5/60) G7-.989 (2/60) G8-.990 (1/60)
8. How long is the snake?

![Snake Image]

a. two  

b. two and one-half  

c. three  

d. three and a half  

e. not given

**Item C-5 (8): .947, Grades 4–8, n = 650.**

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G4–.852 (6/43) G5–.969 (2/43) G6–.983 (3/60) G7–.979 (4/60) G8–.990 (1/60)

The following preceded the first ratio item on the original CA, and applies to Items C–6, C–19, C–30, C–35, C–40, C–43, C–52, and C–54 on this reordered version.

Many questions that follow use the word *ratio*. In the picture below, the ratio of circles to squares is 4 to 3.

![Circle to Square Ratio Image]

24. Which picture shows the ratio of two circles to three triangles?

a.  

b.  

c.  

d.  

e. not given

**Item C-6 (24): .941, Grades 4–8, n = 650.**

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G4–.883 (5/43) G5–.956 (3/43) G6–.932 (8/60) G7–.969 (6/60) G8–.990 (1/60)
52. Which picture shows the same fraction shaded as this picture?

- a.  
- b.  
- c.  
- d.  
- e. not given

**Item C-7 (52):** .916, Grades 6–8, n = 325.
- a) 5  
- b) 298  
- c) 3  
- d) 5  
- e) 8  
- na) 6

G6=.923 (9/60) G7=.857 (19/60) G8=.963 (7/60)

5. Which picture shows two-thirds shaded?

- a.  
- b.  
- c.  
- d.  
- e. not given

**Item C-8 (5):** .916, Grades 4–8, n = 650.
- a) 2  
- b) 596  
- c) 32  
- d) 12  
- e) 7  
- na) 1


16. What fraction of the set of triangles is shaded?

- a. \(\frac{3}{4}\)  
- b. \(\frac{2}{3}\)  
- c. \(\frac{3}{4}\)  
- d. \(\frac{2}{3}\)  
- e. not given

**Item C-9 (16):** .899, Grades 4–8, n = 650.
- a) 8  
- b) 20  
- c) 9  
- d) 22  
- e) 585  
- na) 6

6. Which picture shows \( \frac{1}{3} \) shaded?

\[ \text{a. } \quad \text{b. } \quad \text{c. } \quad \text{d. } \quad \text{e. not given} \]

3. What fraction of this picture is shaded?

\[ \text{a. } \frac{2}{5} \quad \text{b. } \frac{3}{5} \quad \text{c. } \frac{4}{5} \quad \text{d. } \frac{5}{5} \quad \text{e. not given} \]

20. Which picture below shows the same fraction shaded as this set of circles?

\[ \text{a. } \quad \text{b. } \quad \text{c. } \quad \text{d. } \quad \text{e. not given} \]
32. What fraction of this line segment is shaded?

1

a. one-half b. one
c. two d. one-third e. not given

Item C-13 (32): .836, Grades 4–8, n = 650.
a) 544 b) 68 c) 8 d) 12 e) 10 na) 8
G4=.748 (11/43) G5=.820 (15/43) G6=.813 (20/60) G7=.959 (8/60) G8=.908 (17/60)

19. Which number goes with the point?

\[ \text{\( \frac{1}{4} \)} \]

a. \( \frac{1}{4} \) b. \( 3\frac{1}{4} \) c. \( \frac{15}{5} \) d. \( 3\frac{3}{4} \) e. not given

Item C-14 (19): .835, Grades 4–8, n = 650.
a) 10 b) 23 c) 8 d) 543 e) 52 na) 13

33. What fraction of the eggs are circled?

Item C-15 (33): .830, Grades 4–8, n = 650.
a) 540 b) 65 c) 7 d) 8 e) 18 na) 12
G4=.668 (20/43) G5=.833 (14/43) G6=.872 (12/60) G7=.948 (11/60) G8=.917 (16/60)

31. What fraction of this rectangle is shaded?

[Diagram of a rectangle with three shaded sections out of four]

a. \( \frac{1}{4} \) b. 4 c. \( \frac{1}{4} \) d. \( \frac{3}{4} \) e. not given

Item C-16 (31): .829, Grades 4–8, n = 650.
a) 539 b) 9 c) 70 d) 5 e) 21 na) 6
G4=.674 (19/43) G5=.839 (13/43) G6=.847 (15/60) G7=.938 (13/60) G8=.926 (14/60)
4. Which picture shows three-fourths shaded?

a.  

b.  

c.  

d.  

e. not given

Item C–17 (4). .824, Grades 4–8, n = 650.

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| 44 | 12 | 34 | 536 | 21 | na | 2

G4–.680 (17/43) G5–.851 (12/43) G6–.830 (17/60) G7–.897 (16/60) G8–.926 (14/60)

The following explanation and picture preceded a set of five items on the original CA, and applies to Items C–18, C–25, C–31, C–45, and C–47 on this reordered version.

In 44–48, each picture is a fraction of a whole. Tell which answer says how many more parts like the one shown below must be added to make the whole. A sample problem is given below.

\[ \frac{1}{2} \]

1 more part must be added to make a whole.

\[ \frac{1}{2} \]

a. 1  b. 2  c. 3  d. 4  e. not given

Item C–18 (47). .806, Grades 6–8, n = 325.

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| 262 | 23 | 12 | 6 | 13 | na | 9

G6–.737 (27/60) G7–.785 (28/60) G8–.899 (19/60)
28. What picture shows the same ratio as the ratio of shaded to unshaded triangles in this picture?

![Hexagon with three shaded triangles]

- a. ○○○○○○○
- b. 
- c. □□□□□□□
- d. 
- e. not given

Item C–19 (28): .780, Grades 4–8, n = 650.
- a) 507
- b) 55
- c) 23
- d) 17
- e) 31
- na) 17
G4–.687 (16/43) G5–.765 (21/43) G6–.788 (22/60) G7–.836 (21/60) G8–.880 (21/60)

2. What fraction of this picture is shaded?

![Rectangular shape with one shaded square]

- a. four-thirds
- b. three-fourths
- c. one-third
- d. one-half
- e. not given

- a) 26
- b) 506
- c) 64
- d) 3
- e) 46
- na) 5
G4–.650 (21/43) G5–.783 (17/43) G6–.830 (17/60) G7–.806 (26–60) G8–.880 (21/60)
13. Which picture is divided into equal size parts?

a.  

b.  

c.  

d.  

e. not given

---

29. What fraction of this circle is shaded?

a. \[ \frac{1}{4} \]  
b. \[ \frac{1}{3} \]  
c. \[ \frac{1}{2} \]  
d. \[ \frac{2}{3} \]  
e. not given

---

27. Which picture shows \( \frac{3}{4} \) shaded?

a.  

b.  

c.  

d.  
e. not given

---

Item C-21 (13): .776, Grades 4–8, n = 650.

a) 21  
b) 38  
c) 19  
d) 505  
e) 63  
na) 3  
G4-.680 (17/43) G5-.783 (17/43) G6-.788 (22/60) G7-.816 (25/60) G8-.862 (24/60)

Item C-22 (29): .761, Grades 4–8, n = 650.

a) 36  
b) 28  
c) 495  
d) 21  
e) 57  
na) 13  
G4-.582 (23/43) G5-.771 (20/43) G6-.830 (17/60) G7-.887 (17/60) G8-.825 (28/60)

Item C-23 (27): .756, Grades 4–8, n = 650.

a) 37  
b) 5  
c) 28  
d) 78  
e) 492  
na) 10  
G4-.582 (23/43) G5-.765 (21/43) G6-.813 (20/60) G7-.836 (21/60) G8-.871 (23/60)
9. Which picture shows the same fraction as the shaded part of this line segment?

a.  

b.  

c.  

d.  

e. not given

Item C-24 (9): .750, grades 4-8, n = 650.
   a) 40   b) 23   c) 18   d) 488   e) 69 na) 11
G4--.644 (22/43) G5--.753 (23/43) G6--.762 (25/60) G7--.836 (21/60) G8--.816 (30/60)

For the following item, see the directions and illustration preceding Item C-18.

44.  

   a. 1   b. 2   c. 3   d. 4   e. not given

Item C-25 (44): .744, grades 6-8, n = 325.
   a) 18   b) 242   c) 42   d) 8   e) 22 na) 3
   — — G6--.728 (28/60) G7--.775 (30/60) G8--.733 (38/60)

11. Which container measures cups in thirds?

   1 cup  
   1 cup  
   1 cup  
   1 cup  

   a. A   b. B   c. C   d. D   e. not given

Item C-26 (11): .727, Grades 4-8, n = 650.
   a) 94   b) 22   c) 473   d) 25   e) 25 na) 8
   G4--.693 (15/43) G5--.746 (24/43) G6--.745 (26/60) G7--.734 (32/60) G8--.724 (41/60)

49. What is the numerator of the fraction that tells what part of the picture below is shaded?

   a. three   b. four   c. seven   d. three-sevenths   e. not given

Item C-27 (49): .723, Grades 6-8, n = 325.
   a) 14   b) 235   c) 28   d) 14   e) 26 na) 8
   — — G6--.644 (36/60) G7--.744 (31/60) G8--.788 (31/60)
21. Which picture below shows $\frac{3}{4}$ shaded?
   
   a. 
   b. 
   c. 
   d. 
   
   e. not given

Item C–28 (21): .695, Grades 4–8, n = 650.

   a) 13   b) 38   c) 18   d) 118   e) 452   na) 10
   G4–.503 (28/43) G5–.734 (25/43) G6–.686 (33/60) G7–.785 (28/60) G8–.853 (25/60)

30. What fraction of this circle is shaded?

   a. one-third   b. one-fifth   c. one-fourth   d. three   e. not given

Item C–29 (30): .683, Grades 4–8, n = 650.

   a) 122   b) 40   c) 444   d) 6   e) 29   na) 9
   G4–.539 (27/43) G5–.592 (27/43) G6–.728 (28/60) G7–.857 (19/60) G8–.825 (28/60)

The following explanation and picture preceded a set of three items on the original CA, and applies to Items C–30, C–43, and C–52 on this reordered version.

In 35–37, tell what ratio is suggested by each picture. Here is a sample problem:

Wheels on one bicycle is 2 to 1.

35. Bottles in one carton is

   a. 5 to 1   b. 6 to 1   c. 1 to 6   d. 3 to 3   e. not given

Item C–30 (35): .675, Grades 4–8, n = 650.

   a) 15   b) 439   c) 46   d) 85   e) 48   na) 17
   G4–.472 (31/43) G5–.555 (31/43) G6–.771 (24/60) G7–.836 (21/60) G8–.908 (17/60)
For the following item, see the directions and illustration preceding Item C-18.

45. \[ \triangle \] \[ \frac{1}{4} \]  
   a. 1   b. 2   c. 3   d. 4   e. not given

**Item C-31 (45):** .670, Grades 6–8, n = 325.  
a) 20  b) 18  c) 218  d) 35  e) 27  na) 7  
   — — G6-.610 (39/60) G7-.704 (35/60) G8-.706 (43/60)

14. Which picture shows \( \frac{5}{8} \) shaded?

   a.  
   b.  
   c.  
   d.  
   e. not given

**Item C-32 (14):** .652, Grades 4–8, n = 650. 
a) 14  b) 9  c) 424  d) 71  e) 129  na) 2  
   G4-.546 (26/43) G5-.604 (26/43) G6-.728 (28/60) G7-.734 (32/60) G8-.724 (41/60)

59. What fraction of the whole numbers 1, 2, 3, 4, 5, 6, 7 are odd numbers? 
   a. Three sevenths  b. four-sevenths  
   c. four ninths  d. one-third  e. not given

**Item C-33 (59):** .649, Grades 6–8, n = 325. 
a) 44  b) 211  c) 12  d) 14  e) 32  na) 12  
   — — G6-.584 (42/60) G7-.622 (43/60) G8-.743 (36/60)

54. \( 2\frac{1}{4} = \)  
   a. \( \frac{3}{4} \)  b. \( \frac{3}{8} \)  c. \( \frac{3}{4} \)  d. \( \frac{3}{4} \)  e. not given

**Item C-34 (54):** .643, Grades 6–8, n = 325. 
a) 24  b) 15  c) 209  d) 32  e) 27  na) 17  
   — — G6-.576 (43/60) G7-.510 (48/60) G8-.834 (26/60)
25. What is the ratio of shaded to unshaded rectangles?

   a. three to seven  b. three to four
   c. four to three    d. seven to three    e. not given

 a) 73  b) 411  c) 121  d) 23  e) 14  na) 7

15. How many halves equal one whole?
   a. $\frac{1}{2}$  b. 2  c. $1\frac{1}{2}$  d. 1  e. not given

 a) 137  b) 411  c) 28  d) 39  e) 26  na) 8

56. $\frac{1}{3} = a. 3\frac{2}{3}$  b. $2\frac{2}{3}$  c. $3\frac{3}{5}$  d. $10\frac{1}{3}$  e. not given

Item C–37 (56): .621, Grades 6–8, n = 325.
 a) 15  b) 11  c) 202  d) 31  e) 41  na) 25
   —   G6=.593 (41/60) G7=.530 (45/60) G8=.733 (38/60)

34. If this is the unit, then what fraction is shown by this picture?
   a. 3  b. $\frac{1}{2}$  c. $2\frac{1}{2}$  d. $\frac{1}{2}$  e. not given

Item C–38 (34): .595, Grades 4–8, n = 650.
 a) 15  b) 19  c) 387  d) 40  e) 166  na) 23

41. If this is the unit, then what fraction is shaded in this picture?
   a. $2\frac{1}{2}$  b. $2\frac{2}{3}$  c. 3  d. $\frac{3}{4}$  e. not given

Item C–39 (41): .584, Grades 4–8, n = 650.
 a) 131  b) 380  c) 8  d) 15  e) 82  na) 33
   G4=.380 (33/43) G5=.561 (30/43) G6=.644 (36/60) G7/.693 (37/60) G8=.761 (34/60)
23. What is the ratio of circles to triangles?

\[ \triangle \triangle \bigcirc \bigcirc \]

a. 3 to 2  b. 3 to 5  c. 2 to 3  
d. 2 to 5  e. not given

Item C-40 (23): .578, Grades 4-8, n = 650.

a) 196  b) 22  c) 376  d) 29  e) 16  na) 11
G4-.478 (30/43) G5-.524 (33/43) G6-.576 (43/60) G7-.653 (40/60) G8-.743 (36/60)

26. How many thirds equal one whole?

a. 1  b. 2  c. 3  d. 4  e. not given

Item C-41 (26): .569, Grades 4-8, n = 650.

a) 27  b) 53  c) 370  d) 89  e) 88  na) 22
G4-.343 (35/43) G5-.512 (34/43) G6-.669 (34/60) G7-.693 (37/60) G8-.770 (33/60)

40. How many thirteenths equal one whole?

a. \( \frac{1}{13} \)  b. 1  c. 12  d. 13  e. not given

Item C-42 (40): .564, Grades 4-8, n = 650.

a) 71  b) 48  c) 28  d) 367  e) 94  na) 41
G4-.306 (37/43) G5-.500 (35/43) G6-.720 (31/60) G7-.693 (37/60) G8-.761 (34/60)

36. Toes on two feet is

\[ \footnotesize{\begin{array}{c}
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\end{array}} \]

a. ten to two  b. two to ten  c. five to two  
d. two to five  e. not given

Item C-43 (36): .563, Grades 4-8, n = 650.

a) 366  b) 68  c) 41  d) 28  e) 130  na) 17
G4-.386 (32/43) G5-.462 (36/43) G6-.601 (40/60) G7-.734 (32/60) G8-.779 (32/60)
42. What fraction of the balls are tennis balls?

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<td>e.</td>
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Item C–44 (42): .561, Grades 4–8, n = 650.
a) 365  b) 29  c) 166  d) 18  e) 54  na) 18
G4—.355 (34/43)  G5—.574 (29/43)  G6—.694 (32/60)  G7—.632 (42/60)  G8—.642 (47/60)

For the following item, see the directions and illustration preceding Item C–18.

48. \[ \frac{1}{4} \]

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<td>d.</td>
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<td>not given</td>
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Item C–45 (48): .553, Grades 6–8, n = 325.
a) 65  b) 32  c) 180  d) 28  e) 12  na) 7
— — G6—.508 (46/60) G7—.530 (45/60) G8—.623 (48/60)

51. Which letter shows the point \( \frac{2}{3} \)?

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<td>B</td>
<td>c.</td>
<td>C</td>
</tr>
<tr>
<td>d.</td>
<td>D</td>
<td>e.</td>
<td>not given</td>
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</table>

Item C–46 (51): .553, Grades 6–8, n = 325.
a) 5  b) 18  c) 33  d) 180  e) 82  na) 6
— — G6—.466 (48/60) G7—.530 (45/60) G8—.669 (46/60)

For the following item, see the directions and illustration preceding Item C–18.

46. \{ \( \bigcirc \bigcirc \bigcirc \) \} \( \frac{1}{3} \)

<p>| | | | | | |</p>
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<tr>
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<td>1</td>
<td>b.</td>
<td>2</td>
<td>c.</td>
<td>3</td>
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<tr>
<td>d.</td>
<td>4</td>
<td>e.</td>
<td>not given</td>
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</table>

Item C–47 (46): .532, Grades 6–8, n = 325.
a) 39  b) 173  c) 41  d) 30  e) 28  na) 14
— — G6—.516 (45/60) G7—.459 (51/60) G8—.614 (49/60)
The following directions preceded a set of two items on the original CA, and applies to Items C-48 and C-50 on this reordered version.

The first picture of 57 and 58 is a fraction of the whole. For each of these problems, tell which answer shows the whole.

58. \[ \square = \frac{1}{4} \]

\[ \begin{align*}
\text{a.} & \quad \square \\
\text{b.} & \quad \square \quad \square \\
\text{c.} & \quad \square \quad \square \\
\text{d.} & \quad \square \quad \square \quad \square \\
\text{e. not given}
\end{align*} \]

Item C-48 (58): .483, Grades 6–8, n = 325.

\[ \begin{array}{cccccccccc}
a) & 157 & b) & 62 & c) & 72 & d) & 12 & e) & 9 & \text{na}) & 13 \\
\end{array} \]

----

G6—.423 (52/60) G7—.479 (50/60) G8—.550 (51/60)

22. This ruler measures inches by

\[ \text{\includegraphics[width=2cm]{ruler}} \]

\[ \begin{align*}
a. & \quad \text{wholes, halves, and fourths} \\
b. & \quad \text{wholes and halves only} \\
c. & \quad \text{wholes, halves, and thirds} \\
d. & \quad \text{wholes and fourths only} \\
e. & \quad \text{not given}
\end{align*} \]

Item C-49 (22): .483, Grades 4–8, n = 650.

\[ \begin{array}{cccccccccc}
a) & 314 & b) & 64 & c) & 99 & d) & 72 & e) & 82 & \text{na}) & 19 \\
\end{array} \]

G4—.233 (40/43) G5—.456 (37/43) G6—.491 (47/60) G7—.653 (40/60) G8—.733 (38/60)
For the following item, see the directions preceding Item C-48.

57. 

\[
\begin{array}{c}
\text{a.} \\
\text{b.} \\
\text{c.} \\
\text{d.} \\
\text{e. not given}
\end{array}
\]

Item C-50 (57): .458, Grades 6–8, n = 325.

a) 30  b) 149  c) 42  d) 49  e) 36  na) 19

— — G6-.398 (53/60) G7-.438 (52/60) G8-.541 (52/60)

7. Which picture shows fourths?

\[
\begin{array}{c}
\text{a.} \\
\text{b.} \\
\text{c.} \\
\text{d.} \\
\text{e. not given}
\end{array}
\]

Item C-51 (7): .430, Grades 4–8, n = 650.

a) 15  b) 13  c) 280  d) 299  e) 36  na) 7

G4-.306 (37/43) G5-.425 (38/43) G6-.457 (50/60) G7-.438 (52/60) G8-.487 (50/60)

For the following item, see the comments and illustration preceding Item C-6.

For the following item, see the comments and sample ratio preceding Item C-30.
37. Feet to inches is

![12 INCHES = 1 FOOT]

a. 1 to 12  b. 6 to 6  c. 12 to 1  
d. 3 to 4  e. not given

Item C–52 (37): .429, Grades 4–8, n = 650.
   a) 279  b) 27  c) 290  d) 4  e) 21 na) 29
   G4–.484 (29/43) G5–.376 (39/43) G6–.466 (48/60) G7–.346 (55/60) G8–.458 54/60

12. Which letter is above the point \( \frac{1}{2} \)?

![Point with letters A to D]

a. A  b. B  c. C  d. D  e. not given

Item C–53 (12): .406, Grades 4–8, n = 650.
   a) 264  b) 262  c) 50  d) 34  e) 26 na) 12
   G4–.208 (41/43) G5–.290 (41/43) G6–.440 (51/60) G7–.571 (44/60) G8–.688 (45/60)

For the following item, see the comments and illustration preceding Item C–6.

38. What is the ratio of shaded to unshaded parts in this picture?

![Polygon with shaded parts]

a. 1 to 2  b. 1 to 5  c. 1 to 3  
d. 3 to 2  e. not given

Item C–54 (38): .383, Grades 4–8, n = 650.
   a) 367  b) 11  c) 8  d) 3  e) 249 na) 12
   G4–.282 (39/43) G5–.339 (40/43) G6–.389 (54/60) G7–.489 (49/60) G8–.495 (53/60)

50. What is the denominator of the fraction that tells what part of the picture below is shaded?

![Two overlapping triangles]

a. five-thirds  b. five  c. three  
d. two  e. not given

Item C–55 (50): .332, Grades 6–8, n = 325.
   a) 8  b) 108  c) 52  d) 125  e) 28 na) 4
   — G6–.305 (56/60) G7–.265 (56/60) G8–.422 (55/60)
53. How long is the snake?

a. \( \frac{1}{2} \)  b. \( \frac{2}{2} \)  c. \( \frac{3}{2} \)  d. \( \frac{4}{2} \)  e. not given

---

Item C–56 (53): .286, Grades 6–8, n = 325.

- 93
- 44
- 9
- 11
- 158
- na

---

60. If \( \frac{1}{3} \), then what fraction of the picture below is shaded?

- a. three
- b. two and one-half
- c. two and three fourths
- d. eleven-twelfths
- e. not given

---

Item C–57 (60): .233, Grades 6–8, n = 325.

- 17
- 14
- 129
- 76
- 71
- na

---

39. What fraction of the set of objects are triangles?

- a. \( \frac{5}{8} \)
- b. \( \frac{1}{2} \)
- c. \( \frac{3}{4} \)
- d. \( \frac{7}{8} \)
- e. not given

---

Item C–58 (39): .215, Grades 4–8, n = 650.

- 194
- 39
- 140
- 11
- 235
- na

---
55. \[ 3\frac{3}{4} = \text{ a. } \frac{7}{4} \text{ b. } 4\frac{1}{2} \text{ c. } \frac{15}{2} \text{ d. } \frac{15}{4} \text{ e. } \text{not given} \]

**Item C-59 (55):** .203, Grades 6-8, \( n = 325. \)  
- a) 33  
- b) 66  
- c) 30  
- d) 14  
- e) 158  
- na) 24  
- G6-.203 (58/60) G7-.214 (57/60) G8-.192 (60/60)

43. If this is the unit, then what fraction is shaded in the picture below?

\[ \text{ a. } \frac{7}{6} \text{ b. } \frac{5}{6} \text{ c. } \frac{1}{6} \text{ d. } \frac{5}{6} \text{ e. } \text{not given} \]

**Item C-60 (43):** .090, Grades 4-8, \( n = 650. \)  
- a) 235  
- b) 59  
- c) 104  
- d) 47  
- e) 178  
- na) 27  
- G4-.049 (43/43) G5-.049 (43/43) G6-.084 (60/60) G7-.122 (60/60) G8-.192 (60/60)

The following directions were given on the original OA. The information lines for each item follow the same format as the corresponding lines on the CA.

**OPERATIONS ASSESSMENT**

Directions: Read each question and set of answers carefully. Select the choice that you think answers the question. Mark the appropriate space on your answer sheet. If a question does not have the correct answer given, mark space "e" on your answer sheet. If you do not know how to do a problem, leave the answer space blank.

5. Jeremy’s dog had six puppies. He gave away one-half of them. How many puppies did he give away?
   a. 3  
   b. 2  
   c. 1  
   d. 8  
   e. not given

**Item O-1 (5):** .876, Grades 4-8, \( n = 608. \)  
- a) 533  
- b) 28  
- c) 13  
- d) 9  
- e) 17  
- na) 8  
- G4-.831 (1/15) G5-.846 (1/28) G6-.845 (2/28) G7-.921 (1/35) G8-.962 (1/35)

7. Three children went to the store. Two-thirds of them rode bicycles. How many did not ride bicycles?
   a. 1  
   b. 3  
   c. 2  
   d. 5  
   e. not given

**Item O-2 (7):** .807, Grades 4-8, \( n = 608. \)  
- a) 491  
- b) 15  
- c) 73  
- d) 10  
- e) 11  
- na) 8  
4. Willie had $1.00. He spent $\frac{1}{4}$ of it on some baseball cards. How much did he spend?
   a. 4¢  b. 25¢  c. 75¢  d. 96¢  e. not given

| Item O–3 (4): .703, Grades 4–8, n = 608. |
|---|---|---|---|---|---|
| a) 19  b) 428  c) 93  d) 25  e) 24  na) 19 |

2. What is one-half of eighteen?
   a. 18\frac{1}{2}  b. 9  c. 17\frac{1}{2}  d. 8  e. not given

| Item O–4 (2): .662, Grades 4–8, n = 608. |
|---|---|---|---|---|---|
| a) 105  b) 403  c) 21  d) 24  e) 40  na) 15 |

8. Subtract $\frac{3}{8} - \frac{1}{8} = $
   a. $\frac{3}{8}$  b. 3  c. $\frac{7}{8}$  d. $\frac{10}{8}$  e. not given

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<tbody>
<tr>
<td>a) 401  b) 131  c) 9  d) 11  e) 44  na) 11</td>
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</tbody>
</table>

The following direction preceded a set of three items on the original OA, and applies to Items O–6, O–21, and O–30 on this reordered version.

In 16–18, find the sums.

16. $\frac{3}{10} + \frac{5}{10} = $  
   a. $\frac{8}{10}$  b. $\frac{10}{10}$  c. $\frac{10}{10}$  d. $\frac{7}{10}$  e. not given

| Item O–6 (16): .645, Grades 5–8, n = 483. |
|---|---|---|---|---|---|
| a) 10  b) 24  c) 26  d) 312  e) 104  na) 7 |
| G5=.380  G6=.827  G7=.686  G8=.824 |

1. What is 1-fourth plus 1-fourth?
   a. 1-sixteenth   b. 2-eighths   c. 2-sixteenths   d. 2-fourths   e. not given

| Item O–7 (1): .621, Grades 4–8, n = 608. |
|---|---|---|---|---|---|
| a) 5  b) 190  c) 6  d) 378  e) 22  na) 7 |

The following direction preceded a set of three items on the original OA, and applies to Items O–8, O–13, and O–18 on this reordered version.

In 11–13, find the products.
13. \( \frac{3}{8} \times \frac{3}{8} = \)  
\[ \text{a. } \frac{9}{12} \quad \text{b. } \frac{8}{8} \quad \text{c. } \frac{6}{8} \quad \text{d. } \frac{6}{8} \quad \text{e. not given} \]

**Item O-8 (13): .613, Grades 4–8, n = 608.**

a) 49  b) 44  c) 373  d) 47  e) 63  na) 32


22. Find the sum:  \( 2\frac{3}{8} + 3 = \)

\[ \text{a. } \frac{3}{8} \quad \text{b. } \frac{13}{8} \quad \text{c. } 5\frac{3}{8} \quad \text{d. } 2\frac{3}{8} \quad \text{e. not given} \]

**Item O-9 (22): .612, Grades 5–8, n = 483.**

a) 23  b) 16  c) 296  d) 49  e) 72  na) 27

— G5-.503 (7/28) G6-.581 (10/28) G7-.715 (6/35) G8-.712 (9/35)

23. What does this picture show?

![Picture with options]

\[ \text{a. } \frac{3}{8} \text{ of } 12 = 8 \quad \text{b. } \frac{3}{4} \text{ of } 12 = 8 \]

\[ \text{c. } \frac{1}{2} \text{ of } 12 = 3 \quad \text{d. } 2 \text{ to } 1 = 8 \quad \text{e. not given} \]

**Item O-10 (23): .523, Grades 5–8, n = 483.**

a) 253  b) 119  c) 20  d) 22  e) 45  na) 24

— G5-.337 (12/28) G6-.572 (11/28) G7-.578 (12/35) G8-.703 (10/35)

26. Sue is 2\(\frac{1}{4}\) years old. Her brother Tim is 6\(\frac{1}{2}\) years older than Sue. How old is Tim?

\[ \text{a. } 4 \quad \text{b. } 8 \quad \text{c. } 9 \quad \text{d. } 6\frac{1}{2} \quad \text{e. not given} \]

**Item O-11 (26): .517, Grades 5–8, n = 483.**

a) 67  b) 68  c) 250  d) 34  e) 43  na) 21

— G5-.337 (12/28) G6-.445 (14/28) G7-.617 (10/35) G8-.768 (7/35)

3. Add: \( \frac{1}{3} + \frac{1}{2} = \)

[Options]

**Item O-12 (3): .508, Grades 4–8, n = 608.**

a) 264  b) 309  c) 6  d) 5  e) 15  na) 9


> For the following item, see the direction preceding Item O-8.

11. \( \frac{3}{8} \times \frac{3}{8} = \)  
\[ \text{a. } \frac{9}{12} \quad \text{b. } \frac{8}{8} \quad \text{c. } \frac{6}{8} \quad \text{d. } \frac{6}{8} \quad \text{e. not given} \]

**Item O-13 (11): .478, Grades 4–8, n = 608.**

a) 40  b) 49  c) 125  d) 291  e) 73  na) 30

G4-.376 (7/15) G5-.472 (8/28) G6-.400 (16/28) G7-.568 (13/35) G8-.601 (17/35)
33. What fraction of this diagram is shaded?

\[
\begin{array}{c}
\text{Diagram}
\end{array}
\]

a. \(\frac{3}{8}\), since there are 3 shaded parts and 5 unshaded parts.
b. \(\frac{1}{2}\), since \(\frac{1}{4} + \frac{1}{4} = \frac{1}{2}\).
c. \(\frac{2}{5}\), since \(\frac{1}{5}\) is \(\frac{1}{10}\), and \(\frac{1}{10} + \frac{1}{10} = \frac{1}{5}\).
d. \(\frac{3}{8}\), since \(\frac{2}{8} + \frac{1}{8} = \frac{3}{8}\).
e. not given

---

**Item O–14 (33): .457, Grades 7–8, n = 210.**

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<th>c)</th>
<th>d)</th>
<th>e)</th>
<th>na)</th>
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<td>28</td>
<td>32</td>
<td>18</td>
<td>96</td>
<td>30</td>
<td>6</td>
</tr>
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28. Pam has 4\(\frac{1}{2}\) cups of flour. If she uses 3\(\frac{1}{4}\) cups to make a cake, how much flour will she have left?

a. 7\(\frac{3}{4}\) cups  
b. 1\(\frac{1}{2}\) cups  
c. 1 cup  
d. 1\(\frac{1}{4}\) cups  
e. not given

---

**Item O–15 (28): .436, Grades 5–8, n = 483.**

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<th>a)</th>
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<th>c)</th>
<th>d)</th>
<th>e)</th>
<th>na)</th>
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<td>19</td>
<td>211</td>
<td>51</td>
<td>93</td>
<td>57</td>
<td>52</td>
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</tbody>
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31. In a group of thirty-six people, two-ninths of the men have blue eyes. Three-fourths of the people are men. How should you find out how many men have blue eyes?

a. First find \(\frac{3}{4}\) of 36, then take \(\frac{2}{9}\) of that number.
b. First find \(\frac{2}{9}\) of 36, then take \(\frac{3}{4}\) of that number.
c. Find \(\frac{3}{2}\) of 36.
d. Find \(\frac{3}{3}\) of 36.
e. not given

---

**Item O–16 (31): .433, Grades 7–8, n = 210.**

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<th>a)</th>
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<th>na)</th>
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<td>91</td>
<td>59</td>
<td>14</td>
<td>6</td>
<td>16</td>
<td>24</td>
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The following direction preceded a set of two items on the original OA, and applies to Items O–17 and O–29 on this reordered version.

In 24–25, find the products.
24. $3 \times \frac{1}{5} =$
   a. $\frac{1}{15}$  b. $\frac{3}{5}$  c. 15  d. $\frac{3}{5}$  e. not given

Item O-17 (24): .389, Grades 5-8, n = 483.
   a) 54  b) 125  c) 28  d) 188  e) 56  na) 32
   — G5-.171 (19/28) G6-.509 (12/28) G7-.352 (19/35) G8-.629 (15-35)

For the following item, see the direction preceding Item O-8.

12. $4 \times \frac{1}{3} =$
   a. $\frac{1}{12}$  b. $\frac{4}{3}$  c. $\frac{4}{12}$  d. $\frac{12}{3}$  e. not given

Item O-18 (12): .348, Grades 4-8, n = 608.
   a) 74  b) 212  c) 164  d) 39  e) 78  na) 41

20. Gwen did an experiment on vitamins. She used 20 mice. She gave $\frac{3}{4}$ of them special vitamin food. How many mice got special vitamin food?
   a. 15  b. 12  c. 4  d. 16  e. not given

   a) 158  b) 164  c) 42  d) 38  e) 59  na) 22
   — G5-.220 (17/28) G6-.400 (16/28) G7-.284 (23/35) G8-.509 (20/35)

6. What does $\frac{3}{4}$ of 12 equal?
   a. $\frac{4}{8}$  b. $12\frac{3}{4}$  c. 9  d. 3  e. not given

Item O-20 (6): .330, Grades 4-8, n = 608.
   a) 21  b) 146  c) 201  d) 114  e) 82  na) 43
   — G4-.111 (13/15) G5-.245 (16/28) G6-.390 (18/28) G7-.362 (17/35) G8-.620 (16/35)

For the following item, see the direction preceding Item O-6.

17. $\frac{1}{8} + \frac{1}{2} =$
   a. $\frac{5}{8}$  b. $\frac{5}{3}$  c. $\frac{5}{8}$  d. $\frac{1}{8}$  e. not given

Item O-21 (17): .308, Grades 5-8, n = 483.
   a) 149  b) 206  c) 67  d) 26  e) 26  na) 9
   — G5-.110 (24/28) G6-.381 (19/28) G7-.264 (27/35) G8-.574 (19/35)
21. Find the sum: \[
\frac{\frac{1}{5}}{\frac{8}{5}}
\]
a. \(\frac{9}{10}\) b. \(\frac{20}{15}\) c. \(\frac{25}{15}\) d. \(\frac{14}{15}\) e. not given

Item O-22 (21): .308, Grades 5–8, n = 483.
a) 169 b) 36 c) 149 d) 16 e) 98 na) 14
— G5—.085 (26/28) G6—.327 (22/28) G7—.343 (20/35) G8—.592 (18/35)

32. What fraction of this circle is shaded?

a. \(\frac{1}{10} + \frac{1}{2}\) b. \(\frac{1}{4} + \frac{1}{5}\) c. \(1 + \frac{1}{8}\) d. \(\frac{3}{8}\)
e. not given

Item O-23 (32): .280, Grades 7–8, n = 210.
a) 59 b) 79 c) 24 d) 19 e) 25 na) 4
— — — G7—.274 (25/35) G8—.287 (30/35)

27.

Which of the following expressions represents how many inches this plant grew from Monday to Saturday?
a. \(1\frac{1}{8} + 1\frac{1}{2}\) b. \(1\frac{1}{2}\) c. \(1\frac{1}{2} - 1\frac{1}{8}\)
d. \(1\frac{1}{8} - 1\frac{1}{8}\) e. not given

Item O-24 (27): .275, Grades 5–8, n = 483.
a) 115 b) 31 c) 133 d) 93 e) 80 na) 31
— G5—.153 (21/28) G6—.254 (26/28) G7—.313 (21/35) G8—.444 (26/35)

19. Which means the same as “one-third of one-fourth”?
a. \(\frac{1}{3} + \frac{1}{4}\) b. \(3 + \frac{1}{4}\) c. \(\frac{1}{3} \times \frac{1}{4}\) d. \(\frac{1}{3} + 14\) e. not given

a) 161 b) 27 c) 130 d) 8 e) 129 na) 28
— G5—.184 (18/28) G6—.290 (24/28) G7—.333 (25/35) G8—.314 (29/35)
10. How can you find $\frac{1}{3}$ of $\frac{1}{4}$?
   a. Add the numerators, multiply the denominators to get $\frac{4}{12}$.
   b. Find common denominators and add numerators to get $\frac{3}{12}$.
   c. Find common denominators and multiply numerators to get $\frac{3}{12}$.
   d. Multiply the numerators and add the denominators to get $\frac{1}{3}$.
   e. not given

Item O–26 (10): .264, Grades 4–8, n = 608.
   a) 119  b) 111  c) 62  d) 68  e) 161  na) 87

15. How can you add three-fourths and one-third?
   a. First add three and one, then four and three to get four-sevenths.
   b. First change to twelfths, then add numerators to get thirteen-twelfths.
   c. First change to twelfths, then add numerators and denominators to get thirteen-twelfths.
   d. First add three and one, then multiply four times three to get four-twelfths or one-third.
   e. not given

   a) 230  b) 152  c) 52  d) 46  e) 84  na) 44

9. Which picture shows one-sixth of twelve?

   a. [Diagram a]
   b. [Diagram b]
   c. [Diagram c]
   d. [Diagram d]
   e. not given

Item O–28 (9): .245, Grades 4–8, n = 608.
   a) 247  b) 149  c) 11  d) 72  e) 117  na) 12
   G4–.055 (15/15) G5–.153 (21/28) G6–.336 (21/28) G7–.294 (22/35) G8–.462 (24/35)

For the following item, see the direction preceding Item O–17.
25. $9 \times \frac{3}{8} =$
   a. $9\frac{3}{8}$  b. $\frac{27}{8}$  c. 6  d. $\frac{1}{8}$  e. not given

Item O-29 (25): .242, Grades 5–8, n = 483.
   a) 59  b) 35  c) 117  d) 145  e) 91  na) 35

For the following item, see the direction preceding Item O-6.

18. $\frac{1}{3} + \frac{1}{2} =$  a. $\frac{1}{6}$  b. $\frac{1}{6}$  c. $\frac{5}{6}$  d. $\frac{7}{6}$  e. not given

Item O-30 (18): .217, Grades 5–8, n = 483.
   a) 16  b) 105  c) 235  d) 26  e) 91  na) 10

14. Which picture shows the result of $\frac{1}{3} + \frac{1}{2}$?

   a.  b.  c.  d.  e. not given

   a) 114  b) 51  c) 232  d) 26  e) 135  na) 22

35. Tameka runs $\frac{3}{4}$ of a mile each morning. Today she stopped running after going $\frac{3}{4}$ of the way. How far did she run?
   a. $\frac{3}{4}$  b. $\frac{3}{4}$ or $\frac{1}{4}$  c. $\frac{3}{4}$ or $\frac{1}{4}$  d. $\frac{1}{4}$  e. not given

   a) 40  b) 32  c) 48  d) 38  e) 28  na) 24
   — — — G7−.156 (29/35) G8−.203 (32/35)

29. How many thirds equal $1\frac{1}{2}$?
   a. $4\frac{1}{2}$  b. $5\frac{1}{2}$  c. $3\frac{1}{2}$  d. cannot be done  e. not given

   a) 29  b) 10  c) 28  d) 108  e) 27  na) 8
30. Andre had \( \frac{2}{3} \) of a pie. He ate \( \frac{3}{8} \) of that. How much of the pie did he eat?
   a. \( \frac{\pi}{8} \)  
   b. \( \frac{\pi}{8} \) or \( \frac{3}{8} \)  
   c. \( \frac{\pi}{8} \) or \( \frac{4}{8} \)  
   d. \( \frac{\pi}{8} \)  
   e. not given

**Item O–34 (30): .128, Grades 7–8, n = 210.**
   a) 56  
   b) 33  
   c) 31  
   d) 27  
   e) 41  
   na) 22
   — — — G7—.147 (32/35) G8—.111 (34/35)

34. What part of this diagram is shaded?
   
   a. \( \frac{\pi}{8} \) or \( \frac{5}{8} \)  
   b. \( \frac{\pi}{8} \) or \( \frac{7}{8} \)  
   c. \( \frac{\pi}{8} \) or \( \frac{4}{8} \)  
   d. \( \frac{\pi}{8} \)  
   e. not given

**Item O–35 (34): .080, Grades 7–8, n = 210.**
   a) 55  
   b) 33  
   c) 14  
   d) 17  
   e) 73  
   na) 18
   — — — G7—.068 (35/35) G8—.092 (35/35)