

**VIRGINIA STANDARDS OF LEARNING**

**Spring 2005 Released Test**

# **END OF COURSE ALGEBRA 1**

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**CORE 1**

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## Algebra I

### DIRECTIONS

Read and solve each question. Then mark the space on the answer sheet for the best answer. For this test you may assume that the value of a denominator is not zero.

#### SAMPLE

If  $f(x) = x^2 + 2x + 3$ , what is the value of  $f(x)$  when  $x = 6$ ?

- A 27
- B 42
- C 51
- D 60

- 1 Ron paid \$75.00 for 5 compact disks and a case. If the price of each compact disk was \$12.60, what was the price of the case?

- A \$12.00
- B \$12.50
- C \$15.00
- D \$63.00

- 2 What is the solution to

$$4(2x - 3) = 2(3x + 1)?$$

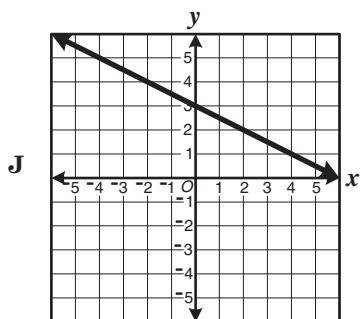
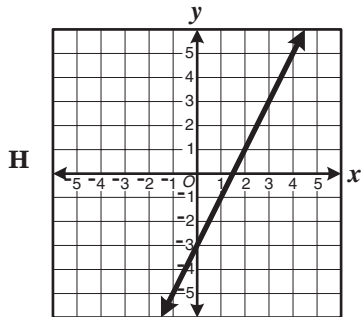
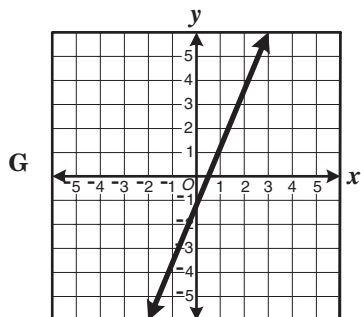
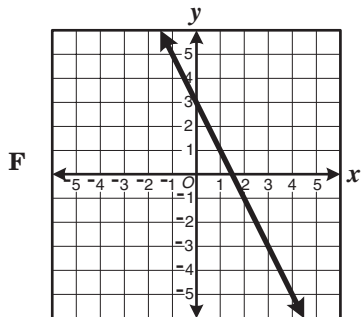
- F -5
- G 1
- H 7
- J 10

- 3 What is the solution to  $8 - 2x \geq -4$ ?

- A  $x \geq 6$
- B  $x \geq 2$
- C  $x \leq 2$
- D  $x \leq 6$

4 Which of the following is most likely a graph of

$$y = -2x + 3?$$



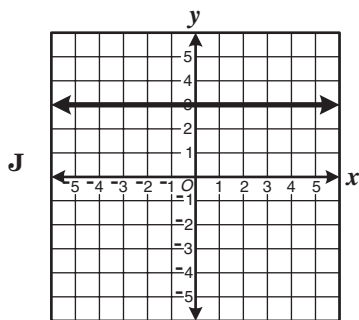
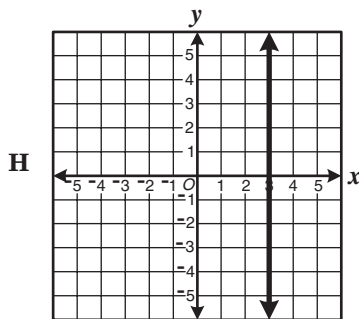
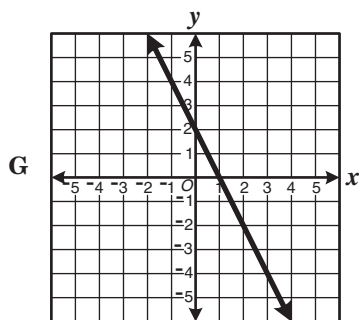
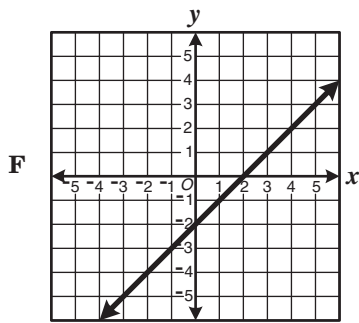
5

$$6a^2 - 2a = 2a(3a - 1)$$

What property makes this equation true?

- A The reflexive property
- B The associative property
- C The commutative property
- D The distributive property

6 Which of the following is most likely the graph of a line with a slope of zero?



7 What is the y-intercept of

$$4x + 8y = 12?$$

A 3

B  $\frac{3}{2}$

C  $-\frac{1}{2}$

D -4

8 What is the slope of the line through (1, 1) and (4, -1)?

F  $-\frac{1}{5}$

G  $-\frac{2}{5}$

H  $-\frac{2}{3}$

J  $-\frac{3}{2}$

9 What is the slope of the line  $3y = 4x + 5$ ?

A 4

B 2

C  $\frac{5}{3}$

D  $\frac{4}{3}$

10 Which is an equation for the line with a slope of  $\frac{1}{2}$  that passes through the origin?

F  $y = \frac{1}{2}x$

G  $y = 2x$

H  $y = \frac{1}{2}$

J  $x = 0$

11 Which is an equation for the line which contains (3, 4) and the origin?

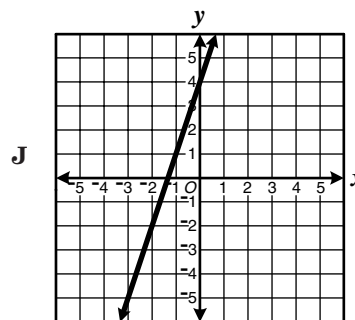
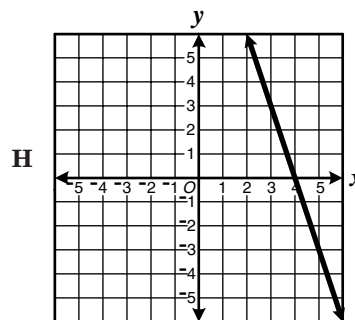
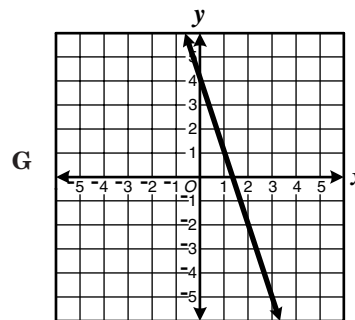
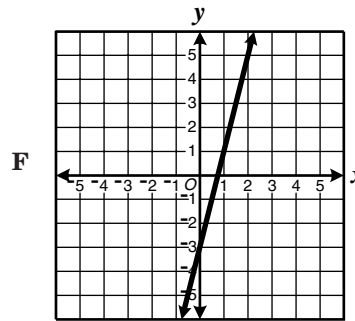
A  $y = \frac{3}{4}x$

B  $y = \frac{4}{3}x$

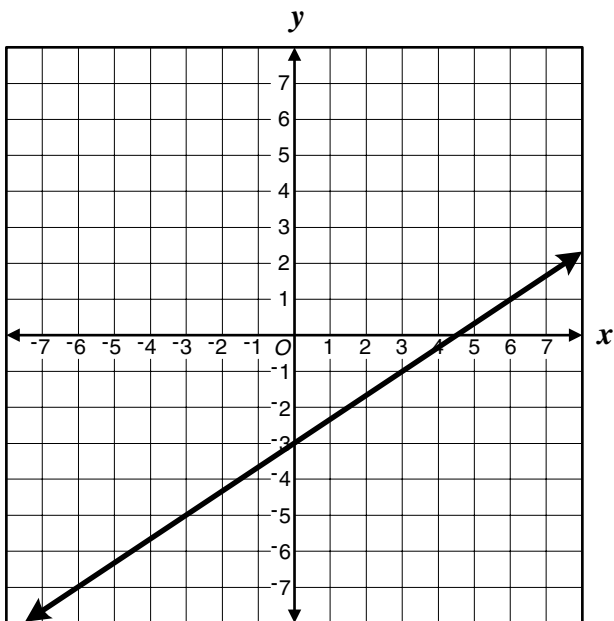
C  $y = 4x + 3$

D  $y = 3x + 4$

12 Which graph best represents a line with a y-intercept of 4 and slope -3?



13



Which equation most likely represents the line shown on the graph?

A  $y = \frac{3}{2}x + 3$

B  $y = 3x + 3$

C  $y = -\frac{2}{3}x - 3$

D  $y = \frac{2}{3}x - 3$

14 
$$\begin{cases} 3x + y = 11 \\ y = x + 3 \end{cases}$$

Which is the solution to the system of equations shown?

F (4, 7)

G (2, 17)

H (2, 5)

J  $\left(\frac{1}{2}, 3\frac{1}{2}\right)$

15 Mrs. Crews bought 4 pencils and 3 pens for \$5.60. Miss Houston bought 2 pencils and 3 pens of the same kind for \$4.60. What was the price of each pencil and each pen?

A \$1.70 per pencil, \$0.20 per pen

B \$0.50 per pencil, \$1.20 per pen

C \$0.17 per pencil, \$1.64 per pen

D \$0.80 per pencil, \$0.80 per pen

16 The perimeter of a rectangular playing field is 244 feet. If its length is 2 feet longer than twice its width, what are the dimensions of the field?

F 20 ft, 41 ft

G 21 ft, 40 ft

H 40 ft, 82 ft

J 42 ft, 80 ft

17 What are the solutions to the equation below?

$$\frac{3}{4}x^2 - 12 = 0$$

A  $x = -4$  or  $x = 4$

B  $x = -12$  or  $x = 9$

C  $x = -3$  or  $x = 3$

D  $x = 3$  or  $x = 9$

18 Which is the solution set for  $x^2 - 5x - 14 = 0$ ?

- F  $\{-7, -2\}$
- G  $\{-7, 2\}$
- H  $\{-2, 7\}$
- J  $\{2, 7\}$

19 If  $z \neq 0$ ,

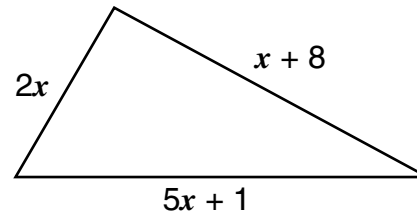
$$\frac{24y^2z^3}{6z} =$$

- A  $18y^2z^2$
- B  $16y^2z^2$
- C  $4yz^3$
- D  $4y^2z^2$

20  $(3xy)(5x^2 + 2xy + 3y^2)$  is equivalent to —

- F  $15x^3y + 6x^2y^2 + 9xy^3$
- G  $15x^3y + 2xy + 3y^2$
- H  $15x^2y + 6x^2y^2 + 9xy^2$
- J  $15x^2 + 5xy + 3y^2$

21



What is the perimeter of the triangle shown in the drawing?

- A  $7x + 9$
- B  $8x + 9$
- C  $8x^3 + 9$
- D  $10x^3 + 9$

22  $3.81 \times 10^{-4}$  may be written as —

- F 0.0000381
- G 0.000381
- H 3,810
- J 38,100

23 Which is equivalent to  $p^6p^2$ ?

- A  $p^8$
- B  $2p^8$
- C  $p^{10}$
- D  $p^{12}$

- 24 If  $y \neq 0$ , which expression is equivalent to the one shown below?

$$\left(\frac{xy^2}{y^4}\right)^6$$

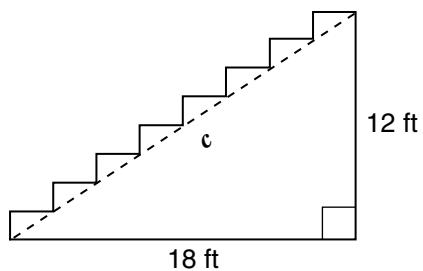
F  $\frac{x^6}{y^{12}}$

G  $\frac{x}{y^2}$

H  $\frac{x^7}{y^8}$

J  $\frac{6x}{y^2}$

- 25 A board that is  $c$  feet long supports the stairs as shown below.



To find the value of  $c$ , Britney used the following expression.

$$\sqrt{12^2 + 18^2}$$

What is  $c$  to the nearest tenth of a foot?

- A 36.0 ft
- B 30.0 ft
- C 21.6 ft
- D 13.4 ft

- 26 When completely factored,

$$x^2 - 7x + 10 \text{ equals —}$$

F  $(x - 5)(x - 2)$

G  $(x - 3)(x - 4)$

H  $(x + 5)(x - 2)$

J  $(x + 4)(x + 6)$

- 27 When  $5x^2 - 5$  is completely factored, which is one of its factors?

A  $x + 1$

B  $x - 5$

C  $5x + 1$

D  $5x - 1$

- 28 Which is the simplest radical form of  $\sqrt{52}$ ?

F  $13\sqrt{2}$

G  $\sqrt{52}$

H  $4\sqrt{13}$

J  $2\sqrt{13}$

- 29 What is the value of  $a(3 - b)$  if  $a = 2$  and  $b = 5$ ?

A  $-4$

B  $0$

C  $5$

D  $16$



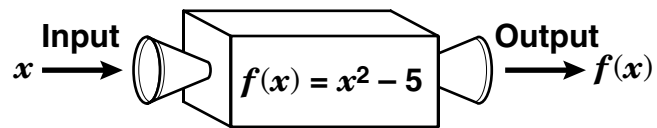
30 The base of a triangle is 3 units more than  $h$ , its height. Which expression represents its area?

- F  $h(h + 3)$
- G  $\frac{1}{2}h(h + 3)$
- H  $h(h - 3)$
- J  $\frac{1}{2}h(h - 3)$

31 Trina's paycheck earnings,  $p$ , varies directly as the number of hours,  $h$ , she works. If she works 19 hours and earns \$187.15, what should she earn if she worked 40 hours?

- A \$394.00
- B \$443.25
- C \$472.80
- D \$512.20

32



When the input is  $\frac{1}{3}$ , what is the output?

- F  $-\frac{29}{6}$
- G  $-\frac{44}{9}$
- H  $-\frac{14}{3}$
- J  $\frac{46}{9}$

33 The ordered pairs in the sets shown below are of the form  $(x, y)$ . In which set is  $y$  a function of  $x$ ?

- A  $\{(1, 3), (2, 6), (3, 1), (6, 3)\}$
- B  $\{(1, 3), (3, 1), (3, 4), (4, 3)\}$
- C  $\{(1, -2), (1, 0), (1, 5), (1, 7)\}$
- D  $\{(0, 3), (1, 4), (2, 4), (2, 8)\}$

- 34 The table shows the relationship between  $a$ , the area of a rectangle, and  $h$ , its height, when the base remains constant.

$h$	2	5	7	12
$a$	8	20	28	48

Which equation represents the relationship between  $h$  and  $a$ ?

- F  $a = h + 6$   
G  $a = 3h + 2$   
H  $a = 4h$   
J  $a = 2h + 4$

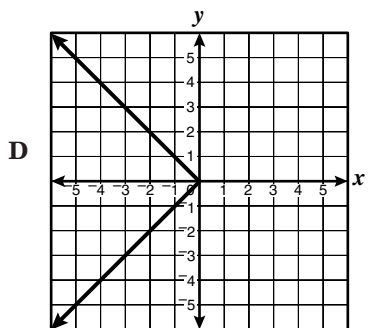
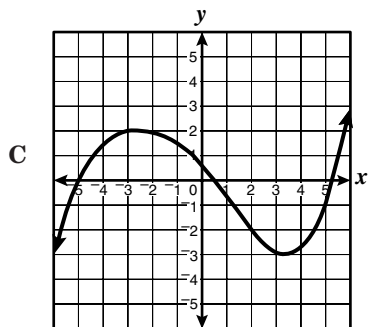
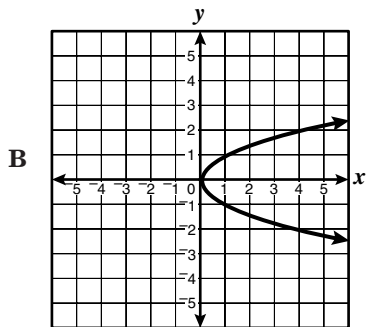
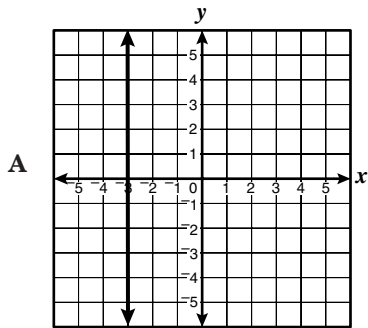
- 35 The total number,  $n$ , of employees at a company depends on the company's yearly gross profits according to the equation  $n = 10p + 20$ , where  $p$  is the yearly gross profit in millions of dollars. If the yearly gross profit declined from 20 million dollars to 15 million dollars, what was the decrease in the number of employees?

- A 50  
B 70  
C 120  
D 220

- 36 Which of these pairs of the form  $(x, y)$  could *not* lie on the graph of a function of  $x$ ?

- F (1, 1) and (3, 1)  
G (1, 1) and (2, 1)  
H (1, 1) and (1, 2)  
J (1, 1) and (2, 2)

37 Which of the following represents the graph of a function of  $x$ ?



38 The function below contains ordered pairs of the form  $(x, y)$ .

$$f = \{(6, 5), (2, 3), (1, 4)\}$$

What is the range of the function?

- F {4}
- G {1, 2, 3, 4, 5, 6}
- H {1, 2, 6}
- J {3, 4, 5}

39 Which is a zero of the function

$$f(x) = 2x - 10?$$

- A 10
- B 8
- C 5
- D -5

40 If  $f(x) = \frac{3 - x^2}{3 - x}$ , what is  $f(2)$ ?

- F -2
- G -1
- H 1
- J 2

- 41 The point  $(q, 0)$  lies on the graph of the following function.

$$f(x) = -\frac{3}{4}x - 6$$

What is the value of  $q$ ?

- A -8
- B -6
- C 6
- D 8

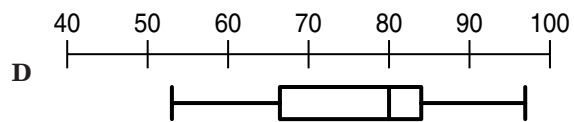
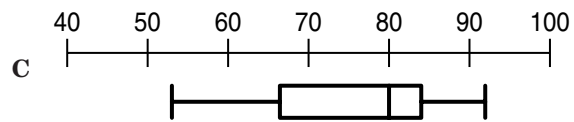
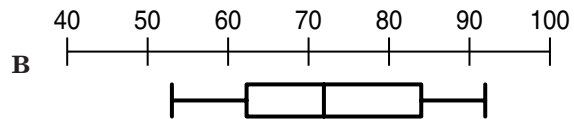
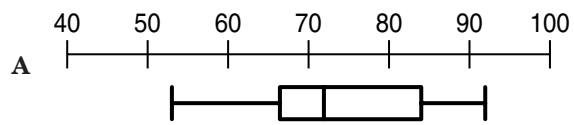
- 42 In the table,  $y$  varies directly with  $x$ .

$x$	10	15	20	25
$y$	6	9	12	15

Which equation best describes the data?

- F  $xy = \frac{5}{3}$
- G  $xy = \frac{3}{5}$
- H  $y = \frac{5}{3}x$
- J  $y = \frac{3}{5}x$

- 43 These are box-and-whisker plots of four different groups of test scores. Which has the greatest range?



44 A student scored 85, 49, 67, and 83 on four tests. What score would the student need to make on the next test to have a mean score of 75?

- F 75
- G 79
- H 86
- J 91

45 {5, 6, 6, 8, 9, 10}

For the data set shown, which measure is the greatest?

- A Mean
- B Median
- C Mode
- D Range

46 Sam and Max sell bags of peanuts and popcorn at baseball games. This matrix shows the number of bags they sold during the July 1st game.

	Sam	Max
Peanuts	136	154
Popcorn	0	38

This matrix shows the number of bags each sold during the July 2nd game.

	Sam	Max
Peanuts	154	167
Popcorn	2	47

Which matrix shows how many more bags were sold during the second game than in the first?

	Sam	Max
F Peanuts	290	321
Popcorn	82	85

	Sam	Max
G Peanuts	18	13
Popcorn	2	9

	Sam	Max
H Peanuts	18	13
Popcorn	4	7

	Sam	Max
J Peanuts	18	13
Popcorn	2	7

47 If  $A = \begin{bmatrix} 2 & 4 \\ 3 & 6 \\ 4 & 8 \end{bmatrix}$  and  $B = \begin{bmatrix} -1 & 5 \\ 2 & 7 \\ 3 & -6 \end{bmatrix}$ ,

what is  $A - B$ ?

A  $\begin{bmatrix} 1 & 9 \\ 5 & 13 \\ 7 & 2 \end{bmatrix}$

B  $\begin{bmatrix} -2 & 20 \\ 6 & 42 \\ 12 & -48 \end{bmatrix}$

C  $\begin{bmatrix} 6 & 4 \\ 9 & 9 \\ 12 & -3 \end{bmatrix}$

D  $\begin{bmatrix} 3 & -1 \\ 1 & -1 \\ 1 & 14 \end{bmatrix}$

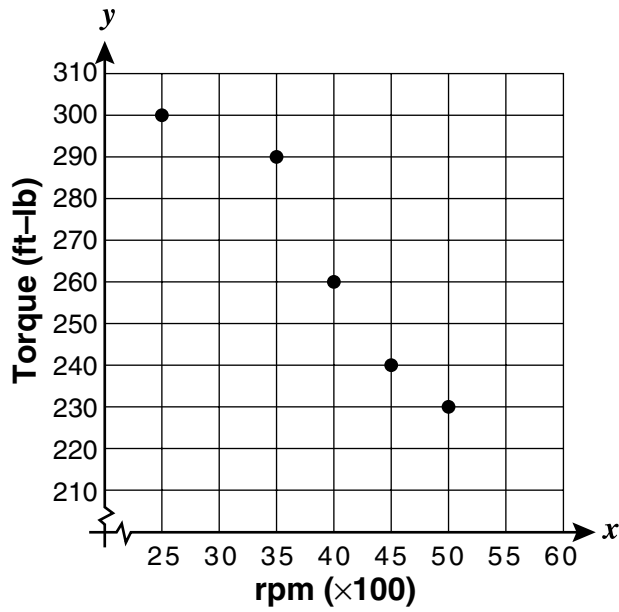
48 A delivery service company maintains several vehicles. The table summarizes the cost for auto insurance related to the number of vehicles insured.

Number of Vehicles	Cost (\$)
1	1,700
2	2,200
3	2,700
4	3,200
5	3,700
6	4,200

Using the equation of a line of best fit for the data, which is the closest estimate of the total cost of insuring eight vehicles?

- F \$5,050
- G \$5,200
- H \$5,500
- J \$5,950

- 49 An engine is tested for torque output at different revolutions per minute.



Which equation most closely defines the line of best fit for the data?

- A  $y = 4.1x + 414$
- B  $y = -4.1x + 414$
- C  $y = 3.1x + 383$
- D  $y = -3.1x + 383$

50

$x$	$y$
70	4
75	7
80	8.5
85	12
90	11
95	13.5
100	15

Which equation defines the linear line of best fit for the data in the table?

- F  $y = 19.5x - 0.35$
- G  $y = -0.35x + 19.5$
- H  $y = -19.5x + 0.35$
- J  $y = 0.35x - 19.5$



## Answer Key

Test Sequence	Correct Answer	Reporting Category	Reporting Category Description
1	A	003	Equations and Inequalities
2	H	003	Equations and Inequalities
3	D	003	Equations and Inequalities
4	F	003	Equations and Inequalities
5	D	003	Equations and Inequalities
6	J	003	Equations and Inequalities
7	B	003	Equations and Inequalities
8	H	003	Equations and Inequalities
9	D	003	Equations and Inequalities
10	F	003	Equations and Inequalities
11	B	003	Equations and Inequalities
12	G	003	Equations and Inequalities
13	D	003	Equations and Inequalities
14	H	003	Equations and Inequalities
15	B	003	Equations and Inequalities
16	H	003	Equations and Inequalities
17	A	003	Equations and Inequalities
18	H	003	Equations and Inequalities
19	D	001	Expressions and Operations
20	F	001	Expressions and Operations
21	B	001	Expressions and Operations
22	G	001	Expressions and Operations
23	A	001	Expressions and Operations
24	F	001	Expressions and Operations
25	C	001	Expressions and Operations
26	F	001	Expressions and Operations
27	A	001	Expressions and Operations
28	J	001	Expressions and Operations
29	A	001	Expressions and Operations
30	G	001	Expressions and Operations
31	A	002	Relations and Functions
32	G	002	Relations and Functions
33	A	002	Relations and Functions
34	H	002	Relations and Functions
35	A	002	Relations and Functions
36	H	002	Relations and Functions
37	C	002	Relations and Functions
38	J	002	Relations and Functions
39	C	002	Relations and Functions
40	G	002	Relations and Functions
41	A	002	Relations and Functions
42	J	002	Relations and Functions
43	D	004	Statistics
44	J	004	Statistics
45	A	004	Statistics
46	G	004	Statistics
47	D	004	Statistics
48	G	004	Statistics
49	D	004	Statistics
50	J	004	Statistics