6.EE.1 Write and evaluate numerical expressions involving whole-number exponents.

A reasonable prediction of the distance d in feet, that a car travels after the driver has applied the brakes can be found by using the formula $d = 0.055r^2$, where r is the speed of the car in miles per hour.

If Mario is driving at 60 miles per hour and applies the brakes, then according to the formula, how many feet will Mario's car travel before it stops?

A. 330
B. 198
C. 10.89
D. 6.6
E. 3.3

2011-8-8-12

Source: National Assessment of Educational Progress, 2011, Grade 8 Mathematics Assessment.

6.EE.2 Write, read, and evaluate expressions in which letters stand for numbers.

a. Write expressions that record operations with numbers and with letters standing for numbers. For example, express the calculation "Subtract y from 5" as 5 – y.
b. Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity. For example, describe the expression 2 (8 + 7) as a product of two factors; view (8 + 7) as both a single entity and a sum of two terms.
c. Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). For example, use the formulas V = s3 and A = 6 s2 to find the volume and surface area of a cube with sides of length s = 1/2.

The Music Palace is having a sale.

Music Palace Sale

$12 for the first CD

$6 for each additional CD

(Prices include tax.)

Write an expression that shows how to calculate the cost of buying n CD's at the sale.

2011-8-9-13

Source: National Assessment of Educational Progress, 2011, Grade 8 Mathematics Assessment.

The length of a rectangle is 3 feet less than twice the width, *w* (in feet). What is the length of the rectangle in terms of *w*?

A. $3 - 2w$
B. $2(w + 3)$
C. $2(w - 3)$
D. $2w + 3$
E. $2w - 3$

2009-8-10-8

Source: National Assessment of Educational Progress, 2009, Grade 8 Mathematics Assessment.

If $x = 2n + 1$, what is the value of x when $n = 10$?

A. 11
B. 13
C. 20
D. 21
E. 211

2007-8-7-1

Source: National Assessment of Educational Progress, 2007, Grade 8 Mathematics Assessment.

If m represents the total number of months that Jill worked and p represents Jill's average monthly pay, which of the following expressions represents Jill's total pay for the months she worked?

A. $m + p$
B. $m \div p$
C. $m \times p$
D. $p \div m$
E. $m - p$

2007-8-11-6

Source: National Assessment of Educational Progress, 2007, Grade 8 Mathematics Assessment.

Tetsu rides his bicycle x miles the first day, y miles the second day, and z miles the third day. Which of the following expressions represents the average number of miles per day that Tetsu travels?

A. $x + y + z$
B. xyz
C. $3(x + y + z)$
D. $3(xyz)$
E. $(x + y + z)/3$

2003-8-7-17

Source: National Assessment of Educational Progress, 2003, Grade 8 Mathematics Assessment.

$3 + 15 \div 3 - 4 \times 2 =$

A. -9
B. -2
C. 0
D. 4
E. 5

2003-8-10-12

Source: National Assessment of Educational Progress, 2003, Grade 8 Mathematics Assessment.

If n represents an even number greater than 2, what is the next larger even number?

A. $n + 1$
B. $2n + 1$
C. $2n$
D. $n + 2$
E. n

2003-8-10-17

Source: National Assessment of Educational Progress, 2003, Grade 8 Mathematics Assessment.

$54 < 3 \times \square$

Write two numbers that could be put in the $\square$ to make the number sentence above true.

1992-8-7-11

Source: National Assessment of Educational Progress, 1992, Grade 8 Mathematics Assessment.

If $x = -4$, the value of $-4x$ is

A. -16
B. -8
C. 8
D. 16

1992-12-5-14

Source: National Assessment of Educational Progress, 1992, Grade 12 Mathematics Assessment.

$3 + 4(8-5) \div 6 =$

A. 6.5
B. 11
C. 27.5
D. 29
E. 34.16

1992-12-14-4

Source: National Assessment of Educational Progress, 1992, Grade 12 Mathematics Assessment.

The length of a rectangle is 3 more than its width. If L represents the length, what is an expression for the width?

A. $3 \div L$
B. $L \div 3$
C. $L \times 3$
D. $L + 3$
E. $L - 3$

1990-8-7-15
1990-12-7-15

Source: National Assessment of Educational Progress, 1990, Grade 8 and Grade 12 Mathematics Assessments.

6.EE.3 Apply the properties of operations to generate equivalent expressions. For example, apply the distributive property to the expression 3 (2 + x) to produce the equivalent expression 6 + 3x; apply the distributive property to the expression 24x + 18y to produce the equivalent expression 6 (4x + 3y); apply properties of operations to y + y + y to produce the equivalent expression 3y.

Which of the following equations has the same solution as the equation $2x + 6 = 32$?

A. $2x = 38$
B. $x - 3 = 16$
C. $x + 6 = 16$
D. $2(x - 3) = 16$
E. $2(x + 3) = 32$

2009-8-10-1

Source: National Assessment of Educational Progress, 2011, Grade 8 Mathematics Assessment.

Consider each of the following expressions. In each case, does the expression equal 2*x* for all values of *x*?

Fill in one oval to indicate YES or NO for each expression.

	Yes	No
a) 2 times *x*	⬭	⬭
b) *x* plus *x*	⬭	⬭
c) *x* times *x*	⬭	⬭

2007-8-9-2

Source: National Assessment of Educational Progress, 2007, Grade 8 Mathematics Assessment.

Which of the following is equal to 6(*x* + 6)?

A. X + 12
B. 6x + 6
C. 6x + 12
D. 6x + 36
E. 6x + 66

2005-8-12-3

Source: National Assessment of Educational Progress, 2005, Grade 8 Mathematics Assessment.

6.EE.4 Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). For example, the expressions y + y + y and 3y are equivalent because they name the same number regardless of which number y stands for.

In the equation *y* = 4 *x*, if the value of *x* is increased by 2, what is the effect on the value of *y* ?

A. It is 8 more than the original amount.
B. It is 6 more than the original amount.
C. It is 2 more than the original amount.
D. It is 16 times the original amount.
E. It is 8 times the original amount.

2005-8-3-10

Source: National Assessment of Educational Progress, 2005, Grade 8 Mathematics Assessment.

6.EE.5 Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.

The point (4, k) is a solution to the equation 3x + 2y = 12. What is the value of k?

A. -3
B. 0
C. 2
D. 3
E. 4

2011-4-8-14

Source: National Assessment of Educational Progress, 2011, Grade 4 Mathematics Assessment.

If the value of the expression $x + 2$ is less than 12, which of the following could be a value of x?

A. 16
B. 14
C. 12
D. 10
E. 8

2003-8-10-3

Source: National Assessment of Educational Progress, 2003, Grade 8 Mathematics Assessment.

6.EE.6 Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.

A plumber charges customers $48 for each hour worked plus an additional $9 for travel. If h represents the number of hours worked, which of the following expressions could be used to calculate the plumber's total charge in dollars?

A. $48 + 9 + h$
B. $48 \times 9 \times h$
C. $48 + (9 \times h)$
D. $(48 \times 9) + h$
E. $(48 \times h) + 9$

1996-8-3-9

Source: National Assessment of Educational Progress, 1996, Grade 8 Mathematics Assessment.

If k can be replaced by any number, how many different values can the expression $k + 6$ have?

A. None
B. One
C. Six
D. Seven
E. Infinitely many

1992-8-12-1
1992-12-12-1

Source: National Assessment of Educational Progress, 1992, Grade 8 and Grade 12 Mathematics Assessments.

6.EE.7 Solve real-world and mathematical problems by writing and solving equations of the form x + p = q and px = q for cases in which p, q and x are all nonnegative rational numbers.

Which of the following equations is NOT equivalent to the equation n + 18 = 23?

A. 23 = n – 18
B. 23 = 18 + n
C. 18 = 23 – n
D. 18 + n = 23
E. n = 23 - 18

2011-8-8-5

Source: National Assessment of Educational Progress, 2011, Grade 8 Mathematics Assessment.

Robert has x books. Marie has twice as many books as Robert has. Together they have 18 books. Which of the following equations can be used to find the number of books that Robert has?

A. x + 2 = 18
B. x + x + 2 = 18
C. x + 2x = 18
D. 2x = 18
E. 2x +2x = 18

2011-8-12-5

Source: National Assessment of Educational Progress, 2011, Grade 8 Mathematics Assessment.

If $3 + w = b$, then $w =$

A. $b/3$
B. $b \times 3$
C. $b + 3$
D. $3 - b$
E. $b - 3$

2003-8-7-18

Source: National Assessment of Educational Progress, 2003, Grade 8 Mathematics Assessment.

If n + n + n = 60, what is the value of n ?

A. 6
B. 10
C. 15
D. 20
E. 30

1990-8-9-2

Source: National Assessment of Educational Progress, 1990, Grade 8 Mathematics Assessment.

$3 \times (\square + 5) = 30$

The number in the box should be

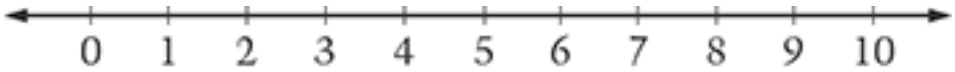
A. 2
B. 5
C. 10
D. 95

1990-8-9-6

Source: National Assessment of Educational Progress, 1990, Grade 8 Mathematics Assessment.

6.EE.8 Write an inequality of the form x > c or x < c to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form x > c or x < c have infinitely many solutions; represent solutions of such inequalities on number line diagrams.

Graph the solution set for $3 \le x \le 5$ on the number line below.



2011-8-9-11

Source: National Assessment of Educational Progress, 2011, Grade 8 Mathematics Assessment.

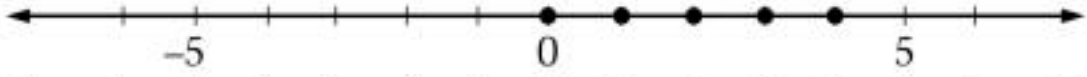
If a > 0 and b < 0, which of the following must be true?

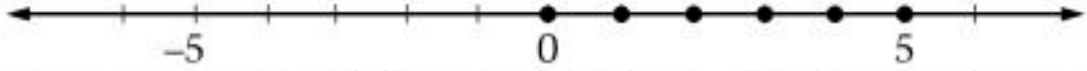
A. ab > 0
B. a – b > 0
C. b – a > 0
D. a + b > 0
E. a + b < 0

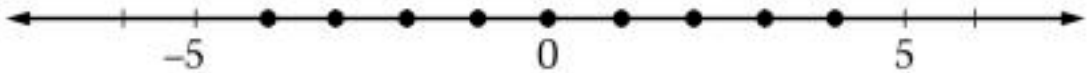
2011-8-12-17

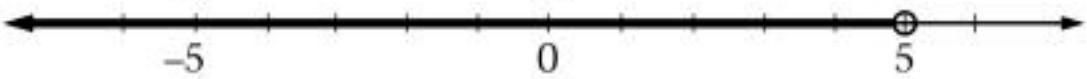
Source: National Assessment of Educational Progress, 2011, Grade 8 Mathematics Assessment.

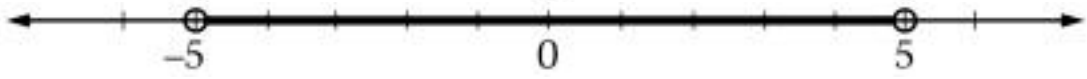
Which of the graphs below is the set of all <u>whole</u> numbers less than 5?

A.


B.


C.


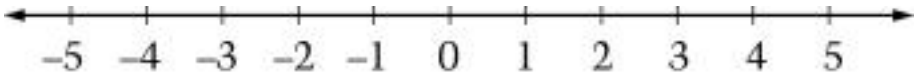
D.


E.


2005-8-12-10

Source: National Assessment of Educational Progress, 2005, Grade 8 Mathematics Assessment.

On the number line below, shade the part of the line that shows the set of all numbers greater than or equal to -1 and less than or equal to 3.



2003-8-9-24

Source: National Assessment of Educational Progress, 2003, Grade 8 Mathematics Assessment.

6.EE.9 Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation d = 65t to represent the relationship between distance and time.

Mika and her mother noticed the road sign shown above while in their car on their way to Rockville. If their speed is about 65 miles per hour, approximately how many more hours are needed to finish the trip?

A. 1
B. 2
C. 3
D. 4
E. 5

2007-8-11-9

Source: National Assessment of Educational Progress, 2007, Grade 8 Mathematics Assessment.

An airplane climbs at a rate of 66.8 feet per minute. It descends at twice the rate that it climbs. Assuming it descends at a constant rate, how many feet will the airplane descend in 30 minutes?

A. 96.8
B. 133.6
C. 1,002
D. 2,004
E. 4,008

2007-8-11-9

Source: National Assessment of Educational Progress, 2007, Grade 8 Mathematics Assessment.

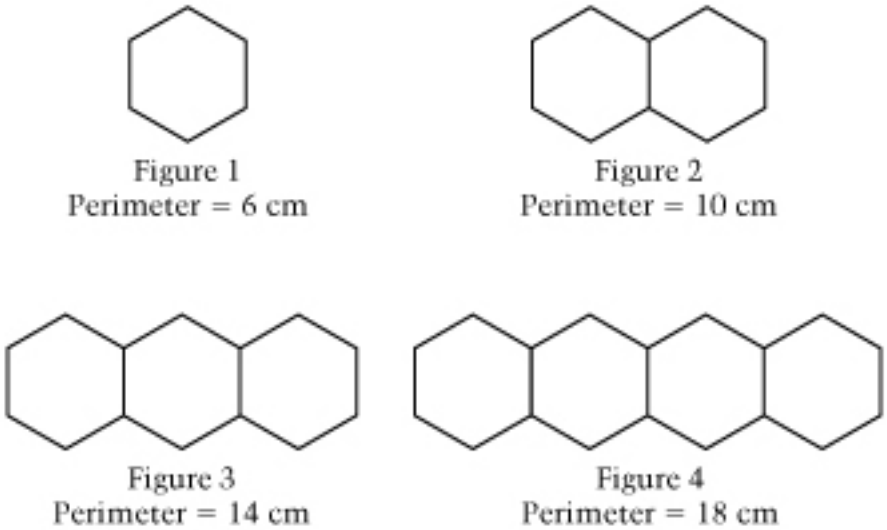
The formula $d = 16t$ gives the distance d, in feet, that an object has fallen t seconds after it is dropped from a bridge. A rock was dropped from the bridge and its fall to the water took 4 seconds. According to the formula, what is the distance from the bridge to the water?

A. 16 feet
B. 64 feet
C. 128 feet
D. 256 feet
E. 4,096 feet

2007-8-7-9

Source: National Assessment of Educational Progress, 2007, Grade 8 Mathematics Assessment.

Each figure in the pattern below is made of hexagons that measure 1 centimeter on each side.



If the pattern of adding one hexagon to each figure is continued, what will be the perimeter of the 25th figure in the pattern?

Show how you found your answer.

2007-8-7-14

Source: National Assessment of Educational Progress, 2007, Grade 8 Mathematics Assessment.

	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
Number Sold, *n*	4	0	5	2	3	6
Profit, *p*	$2.00	$0.00	$2.50	$1.00	$1.50	$3.00

Angela makes and sells special-occasion greeting cards. The table above shows the relationship between the number of cards sold and her profit. Based on the data in the table, which of the following equations shows how the number of cards sold and profit (in dollars) are related?

A. $p = 2n$
B. $p = 0.5n$
C. $p = n - 2$
D. $p = 6 - n$
E. $p = n + 1$

2007-8-7-15

Source: National Assessment of Educational Progress, 2007, Grade 8 Mathematics Assessment.

Sarah has a part-time job at Better Burgers restaurant and is paid $5.50 for each hour she works. She has made the chart below to reflect her earnings but needs your help to complete it.

(a) Fill in the missing entries in the chart.

Hours Worked	Money Earned (in dollars)
1	$5.50
4	
	$38.50
$7\frac{3}{4}$	$42.63

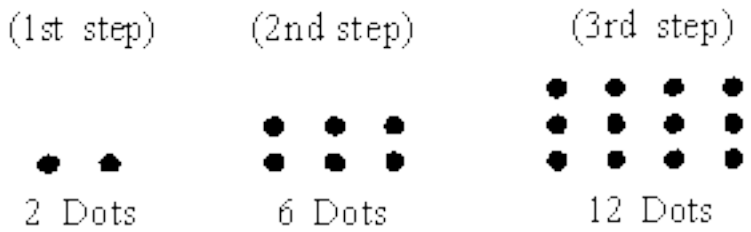
(b) If Sarah works *h* hours, then, in terms of *h*, how much will she earn?

2007-8-9-10

Source: National Assessment of Educational Progress, 2007, Grade 8 Mathematics Assessment.

This question requires you to show your work and explain your reasoning. You may use drawings, words, and numbers in your explanation. Your answer should be clear enough so that another person could read it and understand your thinking. It is important that you show all your work.

A pattern of dots is shown below. At each step, more dots are added to the pattern. The number of dots added at each step is more than the number added in the previous step. The pattern continues infinitely.



Marcy has to determine the number of dots in the 20th step, but she does not want to draw all 20 pictures and then count the dots. Explain or show how she could do this and give the answer that Marcy should get for the number of dots.

1992-8-12-9

Source: National Assessment of Educational Progress, 1992, Grade 8 Mathematics Assessment.