Math 3 Classwork 27

Warm Up

1 In each line, find two pairs of expressions with the same value (circle them):

Independent work

a) 8,000 ÷ 80	80,000 ÷ 80	800 ÷ 8	8,000 ÷ 800
b) 320 × 200	32 × 200	3,200 × 20	3,200 × 200
c) 284 + 34	294 + 44	274 + 44	264 + 14
d) 901 – 65	801 - 165	911 – 65	911 – 75

2 Make an equation and solve the problems:

a) Julia is thinking of the number. She adds 5 to her number, then divides by 2. Her answer is 6.

What number is Julia thinking of?

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b) Victoria is thinking of the number. She multiplies her number by 3, then subtract 2. Her answer is 4. What number is Victoria thinking of?

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Homework Review

3

a) $\_\_\_\_ + \frac{1}{3} = 1$ b) $\frac{2}{3} + \_\_\_ =$ c) $\frac{5}{8} + \_\_\_\_ = 1$

d) $\_\_\_\_ + \frac{9}{10} = 1$ e) $\_\_\_ - \frac{2}{8} = \frac{3}{8}$ f) $\_\_\_\_ - \frac{4}{5} = \frac{1}{5}$

g) $\frac{11}{12} - \_\_\_\_ = \frac{5}{12}$ h) $\frac{4}{7} - \_\_\_ = \frac{2}{7}$

4 Simplify the following fractions:

$\frac{4}{8} =$ $\frac{6}{15} =$ $\frac{4}{12} =$ $\frac{3}{27} =$

REVIEW I

5 Calculate:

$\frac{1}{5}+\frac{3}{5}=$ $\frac{1}{6}+\frac{2}{3}=$ $\frac{4}{14}+\frac{2}{5}=$

Proper and improper fractions:

An improper fraction is a fraction in which the numerator (top number) is greater than or equal to the denominator (bottom number).

Fractions such as $\frac{6}{5}$ or $\frac{8}{5}$ are "improper".

The improper fraction is just another way of writing a mixed number.

6 Write the improper fractions as mixed numbers

a) $\frac{1}{8}$ of 26 b) $\frac{1}{5}$ of 26

c) $\frac{1}{9}$ of 26 d) $\frac{1}{7}$ of 26

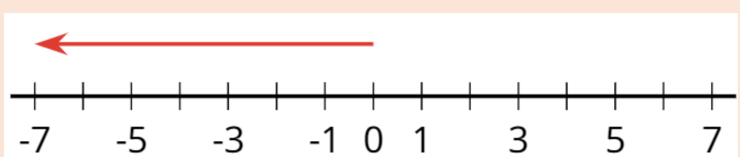
7 Add a fraction to make an equality correct:

a) $\frac{1}{3}+\ldots=2$ b) $\frac{1}{4}+\ldots=2$ c) $\frac{1}{8}+\ldots=2$

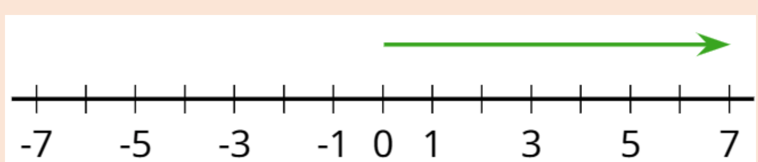
New Material I

Negative number

A negative number is a number that is less than zero. On a horizontal number line, negative numbers are usually shown to the left of 0.



Positive number - A positive number is a number that is greater than zero. On a horizontal number line, positive numbers are usually shown to the right of 0.

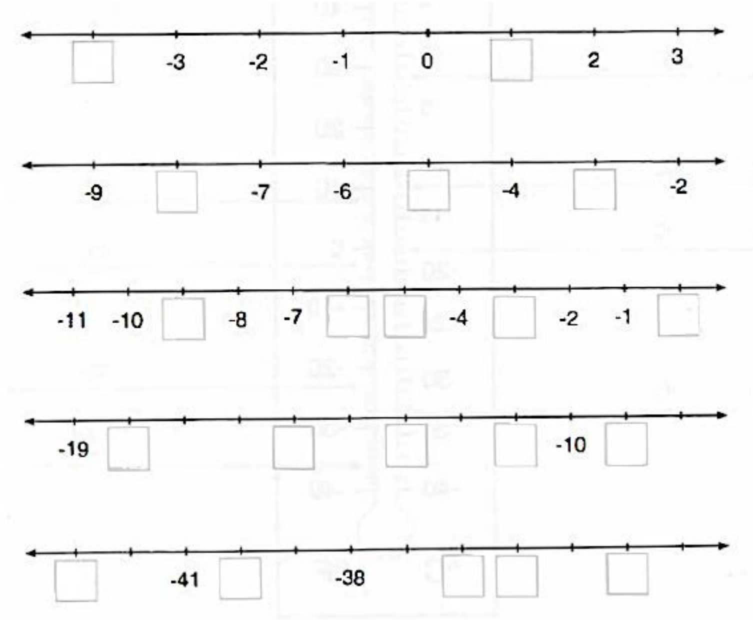


There are only two directions to go on the number line**: left and right.**

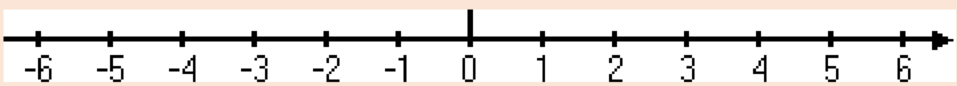
Negative numbers always have a "– "sign in front of the number. If a number has no sign, it usually means that is a positive number.

Example: " –3" is located three units to the left of zero. We know this because the number 3 tells us how many units from zero the number lies, and the sign of the number tells us which side of zero the number lies. In this case, the sign is negative so we will plot the number to the left of zero.

8 Enter the missed numbers:



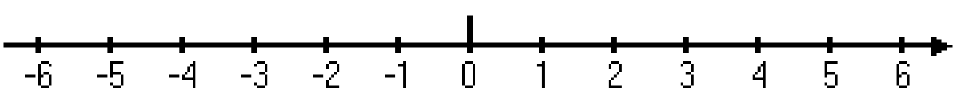
Moving along the number line.



Note the arrowhead on the far-right end of the number line above. That arrow tells you the direction in which the numbers are getting bigger. That arrow also tells you that the negatives are getting *smaller* as they move off to the left. That is. –5 is *smaller* than –4.

9 Compare, using <, > or =.

a) –3 _____ 6
b) –3 _____ – 6
c) 0 _____ 1
d) 0 _____ – 1
e) – 2 _____ 2
f) – 2 ____ – 3



Adding and subtracting a positive number is the same as adding a negative number.

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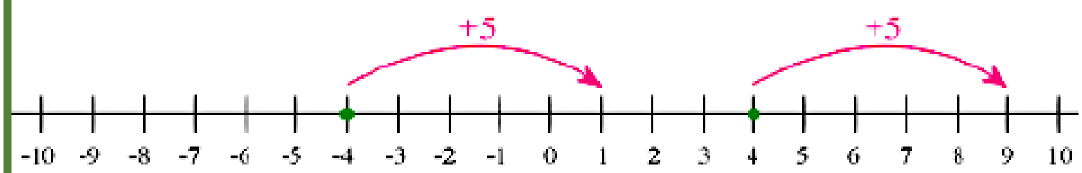
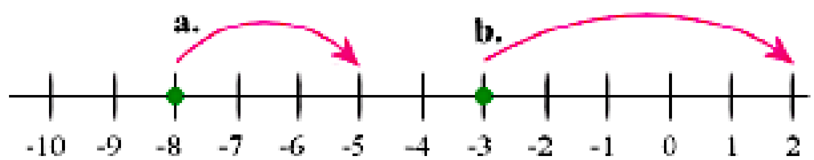
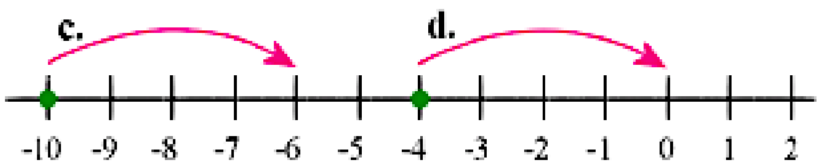
To add number 3 to any number, we start at the number and move 3 units on to the right. To add (–8) + 3, we start at (–8) and move 3 units to the right.

a) Write an addition sentence to match the number line jump:



b) Write an addition sentence to match the number line jump:





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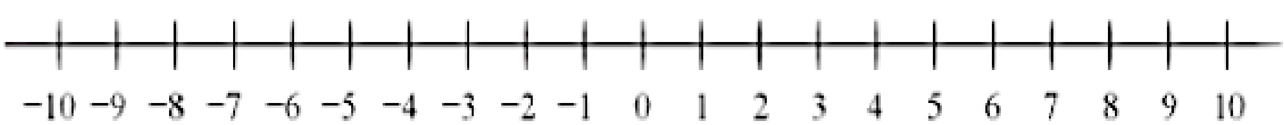
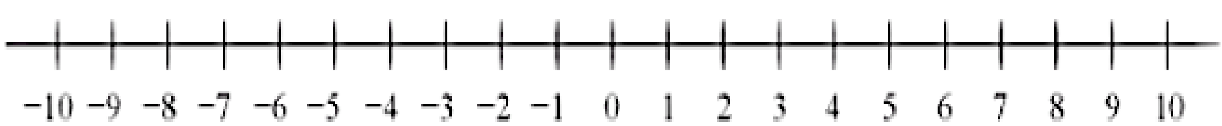
Draw the jumps for each addition sentence number line and find a value:

a) –8 + 2 = b) – 4 + 9 = c) –7 + 5 = d) –10 + 12 =

e) 2 – 8 = f) 9 – 4 = g) 5 – 7 = h) 10 – 12 =





New Material II

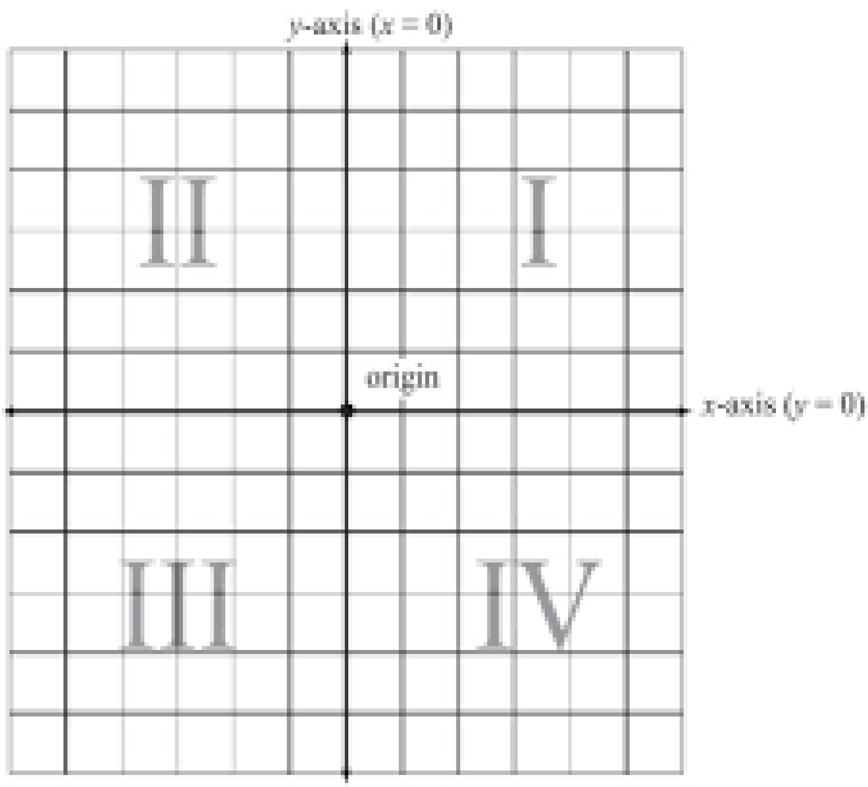
Coordinate Plane (coordinate graphs)

Each point on a number line is assigned a number. In the same way, each point in a plane is assigned a pair of numbers. These numbers represent the placement of the point relative to two intersecting lines.

In **coordinate graphs** two perpendicular number lines are used and are called **coordinate axes.** One axis is horizontal and is called the ***x*-axis.** The other is vertical and is called the ***y*-axis.** The point of intersection of the two number lines is called the **origin** and is represented by the coordinates (0, 0).

Each point on a plane is located by a unique **ordered pair** of numbers called the *coordinates.*
Notice that on the *x*-axis numbers to the right of 0 are positive and to the left of 0 are negative. On the *y*-axis, numbers above 0 are positive and below 0 are negative. Also, note that the first number in the ordered pair is called the ***x*-coordinate,** or **abscissa,** and the second number is the ***y*-coordinate,** or **ordinate.** The *x*-coordinate shows the right or left direction, and the *y*-coordinate shows the up or down direction.

The coordinate graph is divided into four quarters called **quadrants.** These quadrants are labeled in Figure below.



Important:

- In quadrant I, *x* is always positive, and *y* is always positive.
- In quadrant II, *x* is always negative, and *y* is always positive.
- In quadrant III, *x* and *y* are both always negative.
- In quadrant IV, *x* is always positive, and *y* is always negative.

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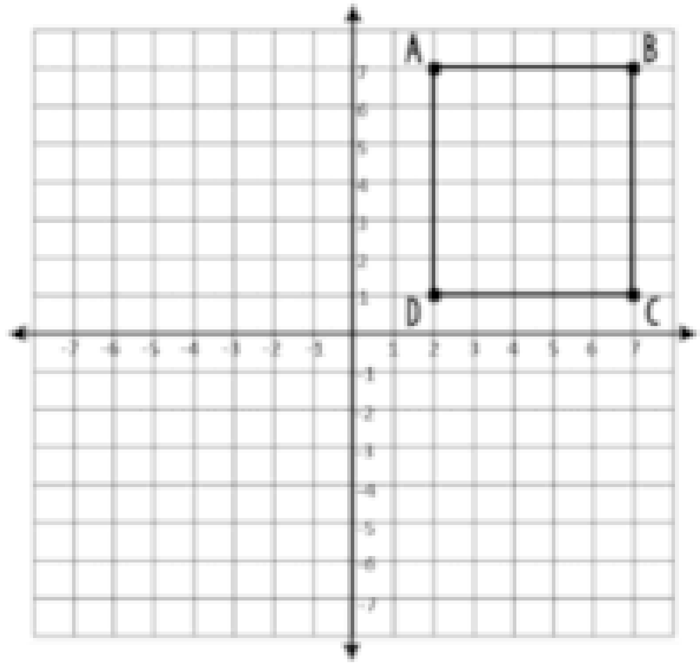
a) Find the coordinates of each vertex of a rectangle:

A (,), B (,), C (,), D (,)

b) Find the length of its sides.



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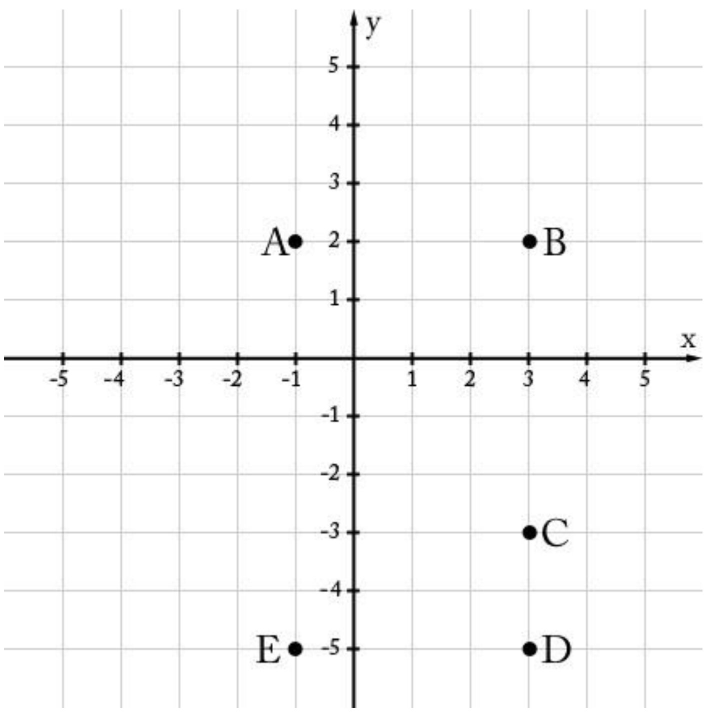
Five points are shown in the coordinate plane below



What are the coordinates of points?

A (,), B (,), C (,),

D (,), E (,)?

What is the distance between points A & B?

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What is the distance between points D & E?

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What is the distance between points B & C?

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Did you know …

Negative numbers Adapted from the article by Leo Rogers

Negative numbers have a long and sometimes contentious history. Mathematicians on the Indian subcontinent had been using negative numbers for a thousand years before Europeans got around to accepting the idea. (We owe our number system, including the number zero, to Indian mathematicians, too.) Chinese mathematicians beat the Europeans by two millennia in using negative numbers. (Humorous note: When the Indians were writing, they used the "plus" sign, "+", to indicate negative numbers.)

In **India**, negative numbers did not appear until about 620 CE in the work of Brahmagupta (598 - 670) who used the ideas of 'fortunes' and 'debts' for positive and negative. By this time a system based on place-value was established in India, with zero being used in the Indian number system. Brahmagupta used a special sign for negatives and stated the rules for dealing with positive and negative quantities as follows:

A debt minus zero is a debt.
A fortune minus zero is a fortune.
Zero minus zero is a zero.
A debt subtracted from zero is a fortune.
A fortune subtracted from zero is a debt.
The product of zero multiplied by a debt or fortune is zero.
The product of zero multiplied by zero is zero.
The product or quotient of two fortunes is one fortune.
The product or quotient of two debts is one fortune.
The product or quotient of a debt and a fortune is a debt.

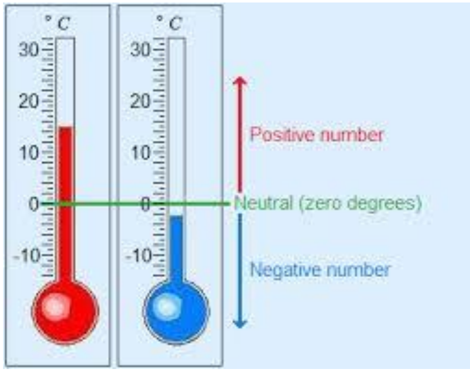
Europeans were not alone in being ignorant of, or dismissive of, negative numbers. Egyptians, nearly two thousand years ago, regarded negative numbers as being ridiculous. Europeans, like the Egyptians, used a mathematics based on geometrical concepts such as area, which is always positive. This retarded their mathematical progress because they were thinking of numbers in an unhelpful way. However, when European scholars started translating Arabic texts obtained from North Africa, they were finally exposed to new ways of thinking, and started catching up.

As we know, practical applications of mathematics often motivate new ideas and the negative number concept was kept alive as a useful device by the Franciscan friar Luca Pacioli (1445 - 1517) in his *Summa* published in 1494, where he is credited with inventing double entry book-keeping.

It was not until the 19th century when British mathematicians like De Morgan, Peacock, and others, began to investigate the 'laws of arithmetic' in terms of logical definitions that the problem of negative numbers was finally sorted out.

Uses of negative numbers:

- A building elevator – Consider a building with an elevator which goes up and down. When it is above ground it is a positive height. When an elevator goes down into the basement, it is now below ground, and the height becomes negative.
- Sport



- Science.
- Finances - in bookkeeping, amounts owed are often represented by red numbers, or a number in parentheses, as an alternative notation to represent negative numbers.
- Find more examples of using negative numbers in our lives.