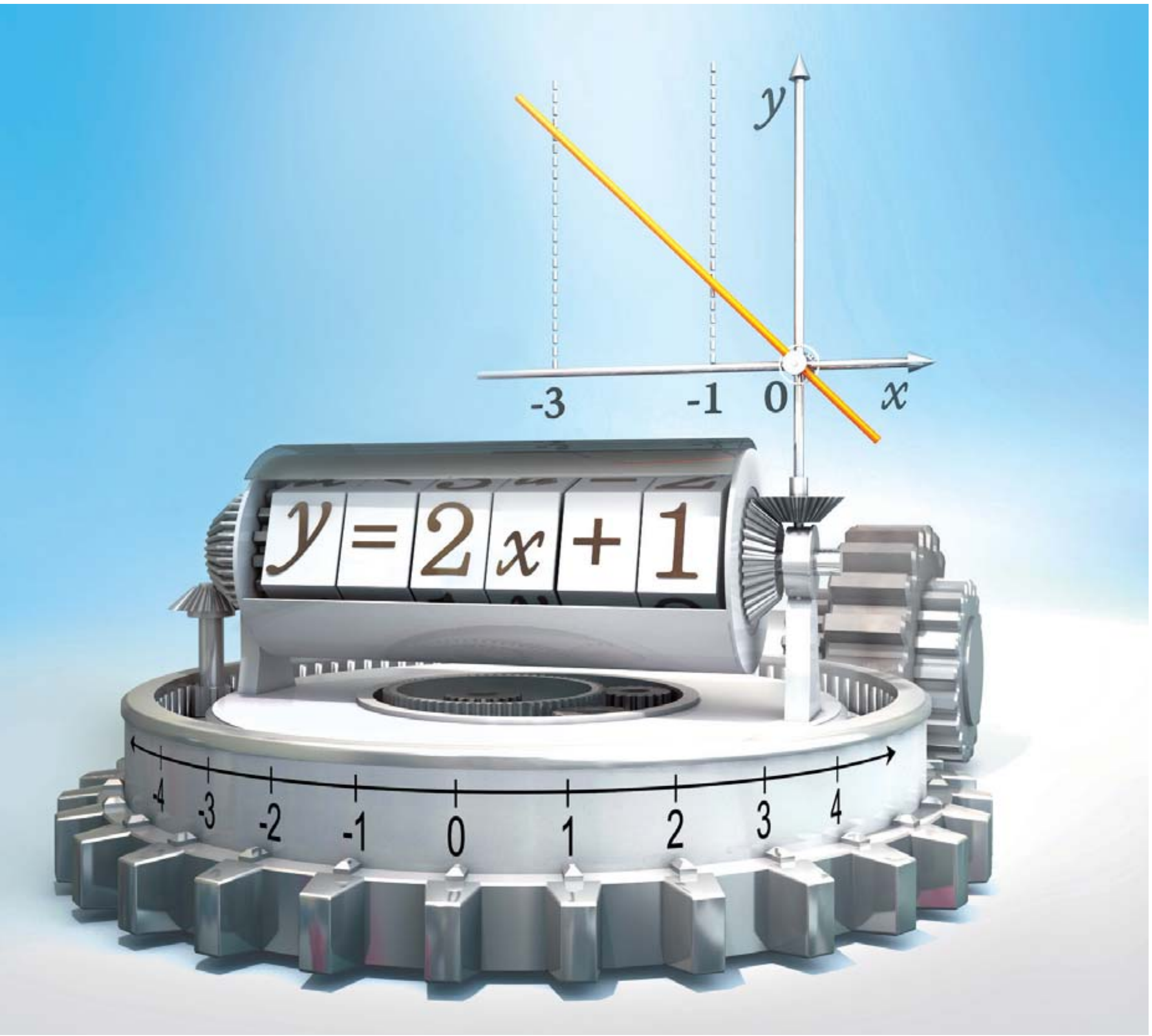
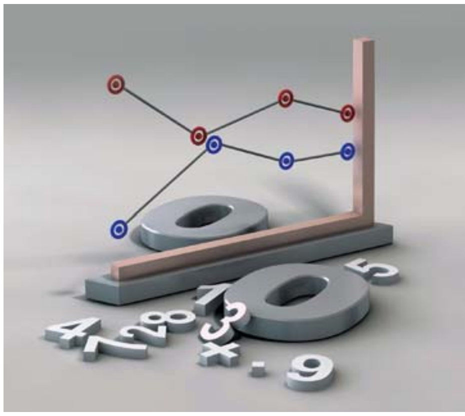
Sample Workbook

Ages 13~15

JEI® Math



Individualized Learning Program
Based upon a Computer Diagnosis
Enables Self-paced Learning



JEI® Self-Learning Systems, Inc.

Advantages of the Self-Learning Method

Reliable Diagnostic System

Through a data-driven, adaptive diagnostic system, JEI can accurately pinpoint a student's weakness based on specific learning objectives.

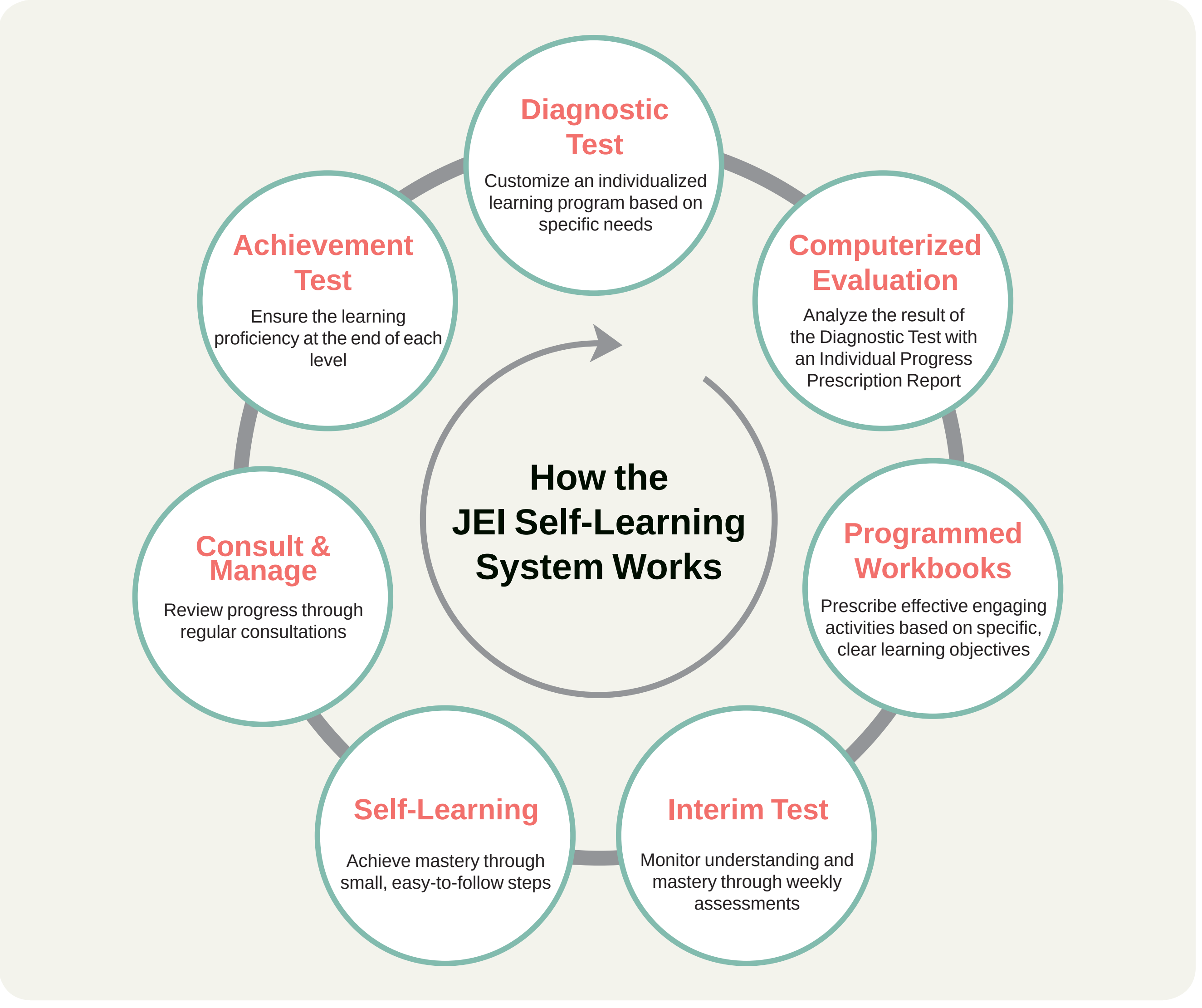
Personalized Learning

Provide personalized workbooks along with an accurate computer- analysis based on specific learning objectives.

Step-by-Step Programmed Workbooks

Help to learn by building a strong understanding of the learning objectives and progress effectively.

How the JEI Self-Learning System Works



JEI Self-Learning Math

JEI Math offers a complete program for grades Pre-K to 9 and encourages conceptual understanding!

Each level of the JEI Math Program is designed with specific learning objectives, providing a step-by-step approach which makes learning easy for students of all abilities. The JEI Math curriculum is aligned with State Standards, covering all major domains: Number Concepts, Operations, Geometry, Measurement, Data Analysis, and more.

Features of JEI Math

JEI Math explores mathematics through everyday questions and experiences. It is designed to develop mathematical thinking skills.

1. Based on specific, clear learning objectives, students learn to study independently through structured materials, the evaluation system, and guidance from the instructor.

2. By learning the principles of each concept first, learning new, more challenging concepts becomes easier, with more speed, accuracy, and complexity.

3. Learning objectives are divided into small, easy-to-digest steps, making even the most difficult concepts mangeable, building self-confidence and strong self-study habits.

4. Going beyond repetition of basic calculations and facts, students focus on depth of understanding with just enough practice to fully master the concepts and objectives.

5. By being exposed to all mathematical domains, students are better able to make the connections between the different domains and between all levels of math, further enhancing problem-solving ability.

Using variables to represent expressions

A The price of a notebook is 80¢.

1. The price of 1 notebook is _____ $\times$ 80¢ $=$ _____ ¢.
2. The price of 2 notebooks is _____ $\times$ 80¢ $=$ _____ ¢.
3. The price of 3 notebooks is _____ $\times$ 80¢ $=$ _____ ¢.
4. The price of notebooks is determined by (the number of notebooks) $\times$ 80¢.
   The price of n notebooks is _____ $\times$ 80¢.
5. $n \times$ 80¢ represents the price of notebooks for any n number of notebooks.
   If 7 notebooks are bought, $n=$ _____ and the total price is _____ $\times$ 80¢ $=$ _____ ¢.

B Sally wants to buy a few bunches of daisies and a plant.
Daisies are sold at \$6 per bunch and the plant costs \$10.
The total cost will change depending on the number of bunches of daisies Sally buys.

1. If Sally buys 1 bunch of daisies and one plant,
   the total cost is (_____ $\times$ \$6) $+$ \$10 $=$ \$ _____.
2. If Sally buys 2 bunches of daisies and one plant,
   the total cost is (_____ $\times$ \$6) $+$ \$10 $=$ \$ _____.
3. If Sally buys 5 bunches of daisies and one plant,
   the total cost is (_____ $\times$ \$6) $+$ \$10 $=$ \$ _____.
4. The total cost is determined by [(the number of bunches of daisies) $\times$ \$6] $+$ \$10.
   If Sally buys n bunches of daisies and one plant,
   the total cost is (_____ $\times$ \$6) $+$ \$10.
5. The amount that Sally needs to pay for the daisies and a plant is represented by
   $n \times \$6 + \$10$ where n is the number of bunches of daisies.
   If 10 bunches of daisies are bought, $n=$ _____ and the total cost for Sally would be (_____ $\times$ \$6) $+$ \$10 $=$ \$ _____.

A letter or a symbol used to stand for a number is called a **variable**.

Convert a verbal sentence to an expression containing variables, and compute.

1. The square roots of 2 are $\pm\sqrt{2}$.
   Therefore, the square of $\sqrt{2}$ is 2, and the square of $-\sqrt{2}$ is _____.
   In other words, $(\sqrt{2})^2=(-\sqrt{2})^2=$ _____.

2. The square roots of 5 are $\pm\sqrt{5}$.
   Therefore, the square of $\sqrt{5}$ is _____, and the square of $-\sqrt{5}$ is 5.
   In other words, $(\sqrt{5})^2=(-\sqrt{5})^2=$ _____.

3. The square of $\sqrt{3}$ is _____.
   In other words, $(\sqrt{3})^2=$ _____.

4. The square of $-\sqrt{9}$ is _____.
   In other words, $(-\sqrt{9})^2=$ _____.

5. $(-\sqrt{3})^2=$ _____ and $(\sqrt{9})^2=$ _____.

6. $(-\sqrt{7})^2=$ _____ and $(\sqrt{13})^2=$ _____.

7. $(\sqrt{0.6})^2=0.6$ and $(-\sqrt{4.3})^2=$ _____.

8. $(\sqrt{0.03})^2=0.03$ and $(-\sqrt{0.09})^2=$ _____.

9. $\left(\sqrt{\frac{8}{11}}\right)^2=\frac{8}{11}$ and $\left(-\sqrt{\frac{17}{19}}\right)^2=$ _____.

10. $\left(\sqrt{\frac{5}{7}}\right)^2=\frac{5}{7}$ and $\left(-\sqrt{\frac{6}{13}}\right)^2=$ _____.

If a number a is positive, then the square roots of a are $\sqrt{a}$ and $-\sqrt{a}$.
Then, the numbers whose square is a are $\sqrt{a}$ and $-\sqrt{a}$.

$$(\sqrt{a})^2=a,\ (-\sqrt{a})^2=a$$

Understand the properties of square root and compute expressions with square root.

Understanding function

A **relation** is a set of ordered pairs. A **function** is a special relation where each x-value in X corresponds to only one y-value in Y.
We write this function f in symbols as,

$$f: X \rightarrow Y.$$

Here, the set X is called the **domain** of the function f, and the set Y is the **replacement set for the range** of the function f.

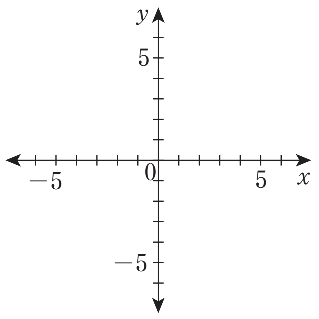
The **domain** of the function f is the set of input values, x. The **range** of the function f is the set of output values, y.

Express the relation $\{(-4, 2), (-1, 5), (1, -2), (2, 3)\}$ as a table, as a graph, and as a mapping. Then determine the domain and range.

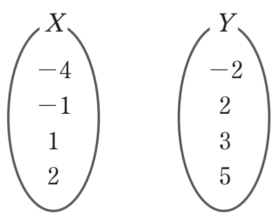
1. Complete the table.

x	-4	-1	1	2
y				

2. Graph each ordered pair on the coordinate plane.



3. Draw an arrow from each x-value in X to the corresponding y-value in Y.



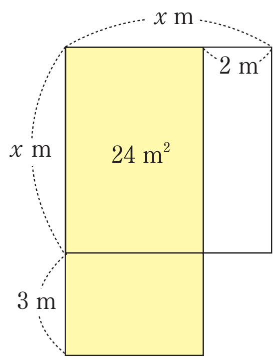
4. State the domain of the relation.

5. State the range of the relation.

Recognize functions and related terms, and determine domain and range.

When one side of a square–shaped garden is decreased by 2 meters and an adjacent side is increased by 3 meters, the area of the new rectangular garden is 24 m^2. Find the side length of the original square–shaped garden.

Set the variable



1. Let x represent the side length of the original garden in meters.
   Then, $x-2=$ the length of the new garden in meters, and ______ = the width of the new garden in meters.

Write an equation

2. The area of the resulting garden is $(x-2)\cdot$ ______ m^2 which is 24 m^2.
   Therefore, the equation is $(x-2)(x+3)=$ ______.

When $\underbrace{\text{one side of a square–shaped garden is decreased by 2 meters}}_{(x-2)\text{ m}}$ and an $\underbrace{\text{adjacent side is increased by 3 meters}}_{(x+3)\text{ m}}$, $\underbrace{\text{the area of the new rectangular garden is 24 m}^2}_{(x-2)(x+3)=24}$. $\underbrace{\text{Find the side length of the original square–shaped garden.}}_{x\text{ m}}$

Solve the equation

3. $(x-2)(x+3)=24$
   $x=$ ______ or $x=$ ______

Check

4. Since x represents the side length of the original garden, x must be a (positive, negative) value.
   Therefore, $x=$ ______.

Answer

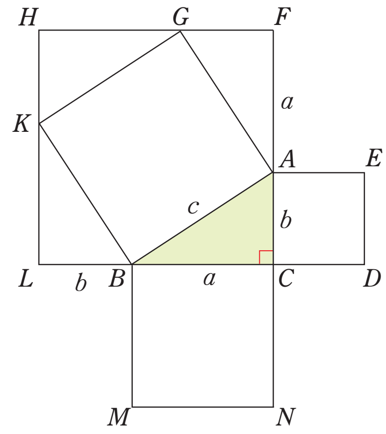
5. The side length of the original square–shaped garden is ______ m.

Easily solve application problems with the quadratic function guided by the step-by-step explanation.

Understanding Pythagorean Theorem

Let's re-examine the relationship among the three sides of a right triangle.

In the figure shown at the right,
$\triangle ABC$ is a right triangle with $m\angle C=90^\circ$.
Let $AB=c$, $BC=a$, and $AC=b$,
so that quadrilateral $HLCF$ is a square whose side measures $a+b$.
Points G and K are located on sides $\overline{FH}$ and $\overline{HL}$, respectively, such that $\overline{AC}\cong\overline{GF}\cong\overline{KH}$.
Also, square $ACDE$ and square $BMNC$ are drawn whose sides are $\overline{AC}$ and $\overline{BC}$, respectively.



1. Right triangles ABC, GAF, KGH, and BKL are congruent triangles by the (SSS, SAS, ASA) Congruence Postulate.
   Since $\overline{AB}\cong\overline{GA}\cong\underline{\qquad}\cong\underline{\qquad}$, quadrilateral $AGKB$ (is, is not) a rhombus.
   Also, since $m\angle ABC+m\angle BAC=m\angle BKL+m\angle KBL=\underline{\qquad}$
   and $\angle BAC\cong\angle KBL$, $m\angle ABC+m\angle KBL=\underline{\qquad}$.
   Therefore, $m\angle KBA=\underline{\qquad}$.

2. Since quadrilateral $AGKB$ is equilateral and contains four right angles, it (is, is not) a square.

3. Since the area of square $AGKB$ is $\underline{\qquad}$ and (Area of square $AGKB$) $=$ (Area of square $HLCF$) $-4\times$ (Area of right triangle ABC),
   we may rewrite this as $c^2=(a+b)^2-4\times\underline{\qquad}$.
   Therefore, $c^2=a^2+b^2$.

4. In a right triangle, the square of the length of the hypotenuse (is, is not) equal to the sum of the squares of the lengths of the legs.
   This property is called the **Pythagorean Theorem**.

Understand Pythagorean theorem, and solve related problems based on it.