Pengembangan Materi Ajar Berbasis TIK Bagi Guru Matematika SMK RSBI

Dipresentasikan pada
Kegiatan Diklat Pengembanan Materi Ajar Berbasis TIK
Bagi Guru SMK RSBI Se-Provinsi DIY, di LPPM UNY
pada 5 sd 2012. 8 Juni 2012

Oleh

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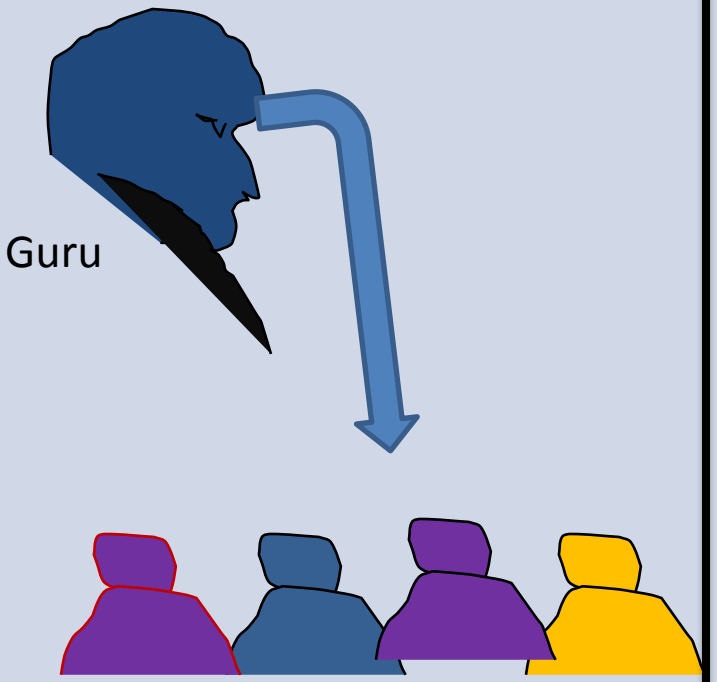
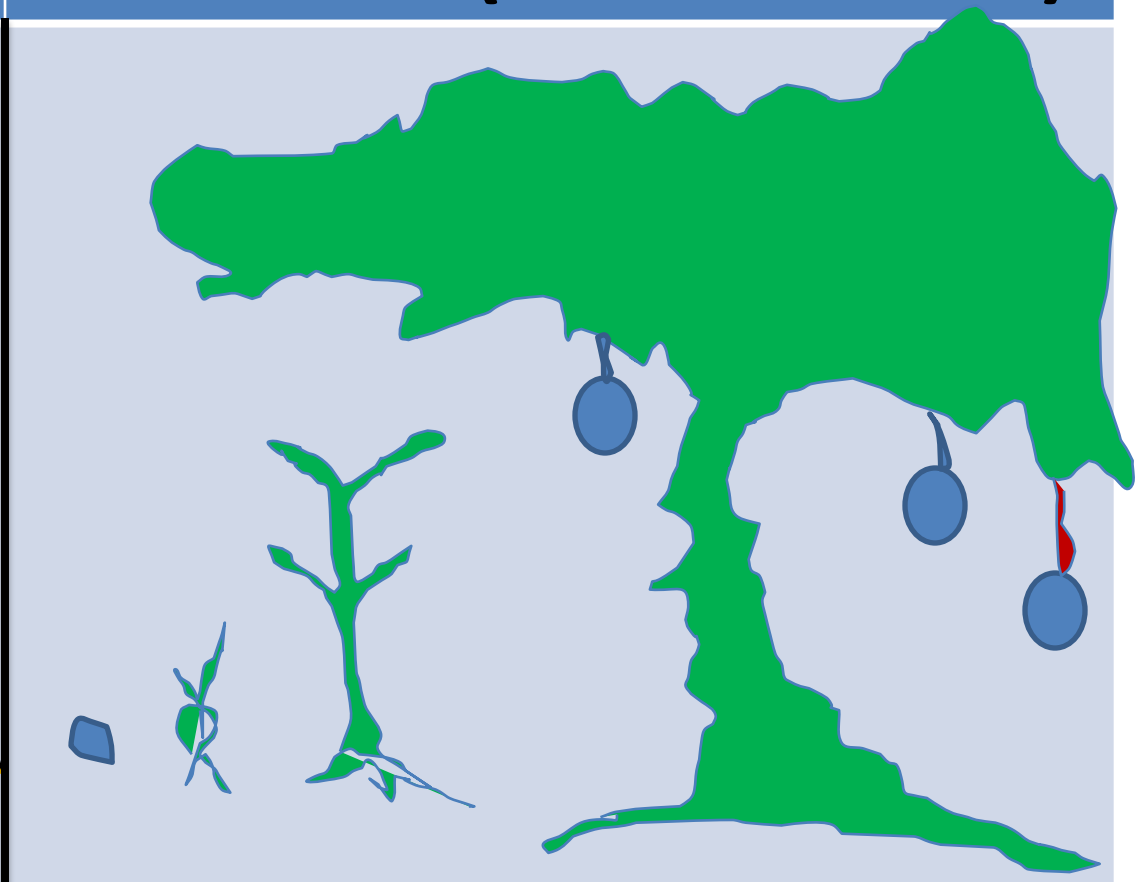
Dosen Jurusan Pendidikan Matematika
FMIPA UNIVERSITAS NEGERI YOGYAKARTA

Pengembangan Materi Ajar dalam RSBI

- Menerapkan proses belajar yang dinamis dan berbasis TIK
- Semua guru mampu memfasilitasi pembelajaran berbasis TIK
- Setiap ruang dilengkapi sarana pembelajaran berbasis TIK

Landasan Pedagogik

(Marsigit)

Tradisional	Innovatif (Berbasis TIK)
	

Pemanfaatan IT pada Model-Model Pembelajaran

Haddad and Drexler (2002) state that there are five different hierarchical levels of education where ICTs can be used: presentation, demonstration, drill and practice, interaction, and collaboration. These levels and example technologies are outlined in the following table (Haddad and Draxler, 2002, p. 9):

Table 3: Appropriate Technology for Different Teaching Levels

	TECHNOLOGY				
USE	**TEXT**	**AUDIO**	**VIDEO**	**COMPUTER**	**INTERNET**
Presentation	X	X	X	X	X
Demonstration	X	X	X	X	X
Drill and Practice	X	(e.g. language lab)		X	X
Interactive	hyperlink			X	X
Collaborative				networked	X

Kelebihan dan Kekurangan IT

Table 4: Affordances and Limitations of Modalities

MODE	INSTRUMENT	AFFORDANCES	LIMITATIONS
Text	Books/magazines	➢ Portable ➢ Durable ➢ Can present complex information ➢ Sequential structure guides learner ➢ Little eyestrain ➢ Moderate cost of development	➢ Difficult to modify (as in localization, updating, etc.) ➢ Requires literacy plus higher-order thinking skills ➢ Content is difficult to extract for use in other resources ➢ High per-unit cost of publication
	Web page	➢ Dynamic and easily modified ➢ Hyperlinks enable nonsequential navigation ➢ Low development cost and very low publishing cost ➢ Supports interactivity (e.g., navigation, user-centred information, etc.) ➢ Can support assessment	➢ Nonsequential structure may obscure critical information or cause confusion ➢ Reading may cause fatigue ➢ Requires PC, electricity, connection ➢ Potential additional system requirements (e.g., Java, plug-ins)

Kelebihan dan Kekurangan IT

MODE	INSTRUMENT	AFFORDANCES	LIMITATIONS
Images	Printed photos, maps, and schematic drawing	➢ Concrete, specific, detailed information ➢ Appropriate for learners with "visual intelligence" ➢ Engaging and motivating for many learners	➢ Low information value relative to text ➢ Resistant to reuse by learners ➢ "Visual literacy" skills required for best use ➢ High reproduction cost
	Digital photos, maps, and schematic drawings	➢ Benefits similar to printed photos ➢ Easily copied, shared, and used ➢ Low reproduction and publishing costs ➢ Can be data-based or Web-served for delivery to handheld computers and other "anytime, anywhere" devices	➢ Limitations similar to printed photos ➢ Require PC and electricity, and possibly an Internet connection

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Kelebihan dan Kekurangan IT

Audio	Radio	➢ Can present contemporary and topical information easily ➢ Highly accessible and potentially engaging format (no literacy skills required) ➢ Widely adopted in developing countries ➢ Moderate production costs ➢ Highly scalable ➢ Low-cost hardware	➢ Information is not durable; learners can't "review" a broadcast ➢ Poor presentation of complex concepts ➢ No visual component (e.g., schematics, maps, photos) Synchronous form requires system-wide coordination (e.g., announcements, class schedules, etc.)
	Audiotape	➢ Widely adopted ➢ Low hardware cost ➢ Information persists (tape may be reviewed many times) ➢ Moderate production and reproduction costs ➢ Highly accessible ➢ Supports asynchronous presentation ➢ Sequential structure guides learner	➢ Poor presentation of complex concepts ➢ Medium is not durable, especially in extreme circumstances ➢ Studio recordings not easily modified or well-suited for current events
	Digital audio (Web- and CD-based)	➢ Can present contemporary and topical information easily (Web) ➢ Information is durable (that is, it can be reviewed many times) ➢ Medium is durable ➢ Moderate production costs ➢ Low reproduction costs; easily scaled ➢ Easily catalogued and reused (by developers and users) ➢ Can be indexed or catalogued to enable nonsequential access	➢ Requires robust PC and/or high-speed Internet connection ➢ High storage "overhead" (in terms of hard drive capacity) ➢ May not support presentation of complex concepts

Kelebihan dan Kekurangan

Video	Analog	➢ Highly accessible and potentially engaging format (no literacy skills required) ➢ Sequential structure guides learner ➢ Concrete, specific, detailed	➢ High production costs ➢ Moderate reproduction costs ➢ Complex information may be difficult to present

MODE	INSTRUMENT	AFFORDANCES	LIMITATIONS
		information ➢ Appropriate for learners with "visual intelligence" ➢ Engaging and motivating for many learners ➢ Moderate hardware costs	effectively ➢ Information may prove difficult for some learners to analyse/synthesize
	Broadcast	➢ Same as analog video ➢ Can present contemporary or topical information easily	➢ Same as analog video; however, costs may be higher
	Digital (Web- and CD-based)	➢ Same as analog video (NOTE: "moderate hardware costs" is not applicable) ➢ Can present contemporary or topical information easily ➢ Easily catalogued and reused (by developers and users) ➢ Can be indexed or catalogued to enable nonsequential access	➢ Same as analog video ➢ Requires robust PC and/or high-speed Internet connection ➢ High storage "overhead" (in terms of hard drive capacity)

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Kelebihan dan Kekurangan

Simulations	Interactive (Web- and CD-based)	➢ Same as noninteractive simulations ➢ Active-learning characteristics engage learners via several paths to reinforce concepts ➢ Quantitative elements are supported and reinforce conceptual learning ➢ Engaging and motivating for many learners ➢ Can support assessment	➢ Requires robust PC and/or high-speed Internet connection ➢ Potential for additional system requirements (e.g., Java, plug-ins)

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Klasifikasi

Table 5: Classification of tools.

		Information modality	Linearity	Number of Participants	Time (in)dependency	Immediacy
Explorative Environment	Interactive video	Dynamic visual	Linear or alinear	Not Applicable	Not Applicable	Immediate or non-immediate
	CD-ROM	Text, dynamic visual display	Linear	Not Applicable	Not Applicable	Immediate or non-immediate
	Hypermedia	Text, dynamic visual display	Alinear	Not Applicable	Not Applicable	Immediate or non-immediate
Interactive Environment	Audio-conferencing	Audio	Linear or alinear	One-one one-many many-many	Synchronous	Immediate
	Audiographic conferencing	Audio, still graphics	Linear or alinear	One-one one-few few-one	Synchronous	Immediate
	Computer conferencing	Dynamic visual display, mainly written words	Linear or alinear	Many-many	Asynchronous	Non-Immediate
	Video conferencing	Audio, still graphics, nonverbal information	Linear or alinear	One-one one-many many-many	Synchronous	Immediate
	Internet	Dynamic visual display, mainly written words	Alinear	Many-many	Asynchronous	Non-immediate

Taken from Van Baalen and Moratis, 2001, p. 106.

IT dan Psikomotor

It could be useful to look at the taxonomy of the psychomotor domain before examining the appropriateness of ICTs for teaching and learning practical skills. The psychomotor domain can be divided into 5 main categories:

1. Imitation: The learner goes through a period of trial and error to imitate an act that has been explained and demonstrated.
2. Manipulation: The learner continues to practice the skill until some level of proficiency is attained.
3. Precision: The learner continues to practice until he/she attains the competency requirement.
4. Articulation: The learner attains a higher level of competency that allows him/her to solve problems.
5. Naturalization: The learner reaches a stage where responses can be automatic, without thinking.

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Pemanfaatan WEB

Table 8: Web Content Accessibility Guidelines 1.0 as developed by the WAI through the W3C

Guideline	Overview
Provide equivalent alternatives to auditory and visual content	Provide content that, when presented to the user, conveys essentially the same function or purpose as auditory or visual content.
Don't rely on colour alone	Ensure that text and graphics are understandable when viewed without colour.
Use markup and style sheets and do so properly	Mark up documents with the proper structural elements. Control presentation with style sheets rather than with presentation elements and attributes.
Clarify natural language usage	Use markup that facilitates pronunciation or interpretation of abbreviated or foreign text.
Create tables that transform gracefully	Ensure that tables have necessary markup to be transformed by accessible browsers and other user agents.
Ensure that pages featuring new technologies transform gracefully	Ensure that pages are accessible even when newer technologies are not supported or are turned off.
Ensure user control of time-sensitive content changes	Ensure that moving, blinking, scrolling, or auto-updating objects or pages may be paused or stopped.
Ensure direct accessibility of embedded user interfaces	Ensure that the user interface follows principles of accessible design: device-independent access to functionality, keyboard operability, self-voicing, etc.
Design for device-independence	Use features that enable activation of page elements via a variety of input devices.
Use interim solutions	Use interim accessibility solutions so that assistive technologies and older browsers will operate correctly.
Use W3C technologies and guidelines	Use W3C technologies (according to specification) and follow accessibility guidelines. Where it is not possible to use a W3C technology, or where doing so results in material that does not

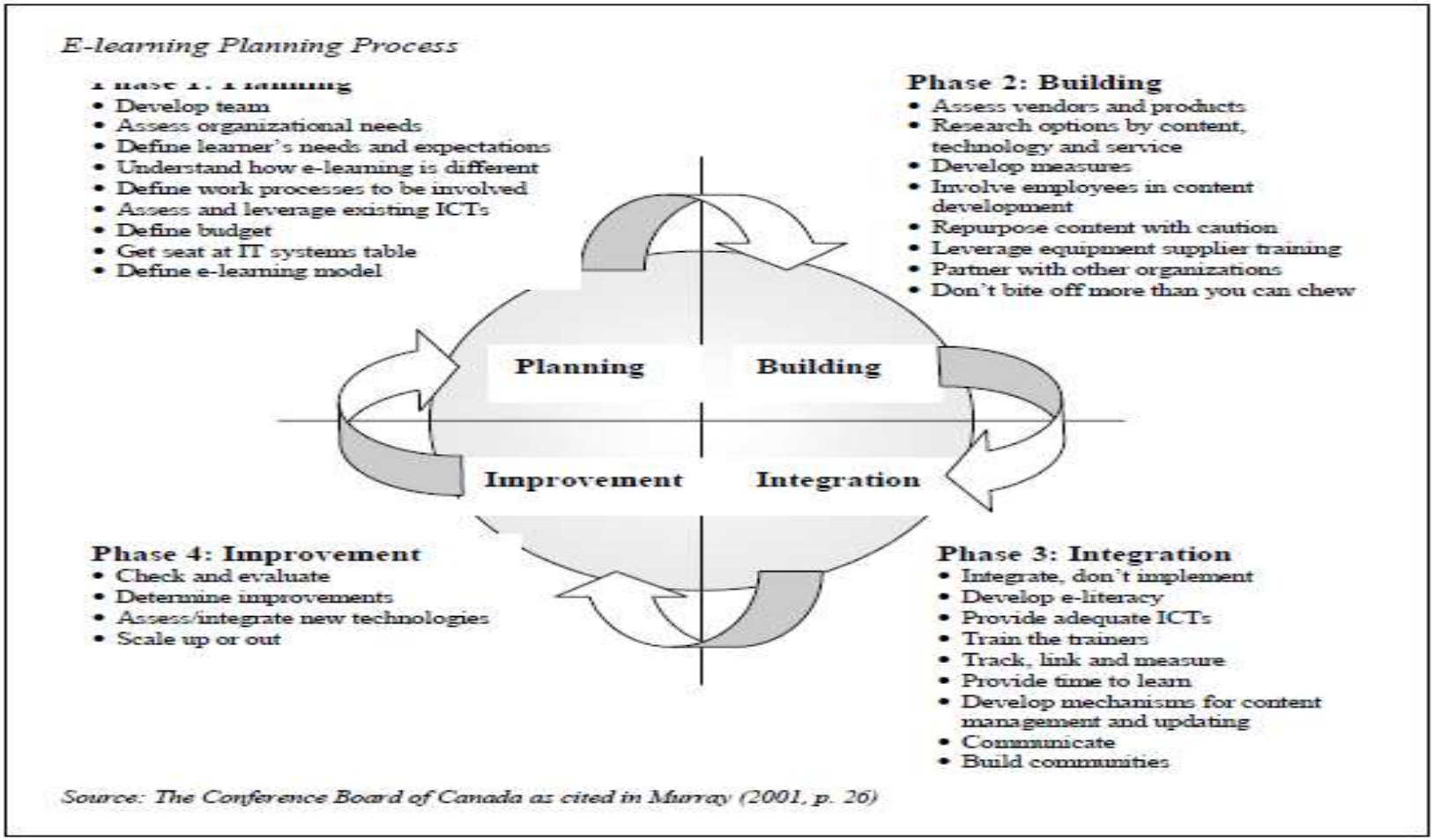
Pemenfaatan Web

	transform gracefully, provide an alternative version of the content that is accessible.
Provide context and orientation information	Provide context and orientation information to help users understand complex pages or elements.
Provide clear navigation mechanisms	Provide clear and consistent navigation mechanisms -- orientation information, navigation bars, a site map, etc. -- to increase the likelihood that a person will find what they are looking for at a site.
Ensure that documents are clear and simple	Ensure that documents are clear and simple so they may be more easily understood.

1. Analyse Needs – Conduct a thorough needs analysis based on the needs and goals of the target audience.
2. Draft Mission Statement – Develop a mission statement, definition of the course, and due dates for milestones (design strategy document, script storyboard, alpha, and beta tests, final due date).
3. Create Audience Profile – Gather specific information about the audience such as its likes and dislikes, the kind of music it prefers, level of education, hobbies, etc.
4. Write Objectives – Identify clear objectives based on the needs and goals stated earlier.
5. Analyse and Outline Content – Develop an outline of the course and determine how the course should flow.
6. Layout Course Map – Specify the course structure in a visual format and integrate any available data to produce a blueprint of the course.
7. Define Treatment – Determine what the course should look and feel like.
8. Select Learner Activities – Determine the instructional strategies that should be used to match the target audience.
9. Create Detailed Plan – Using the course map, "create a structured storyboard that links objectives, strategies, content, and treatment to specific frames in the course", develop the screen design concepts, and assemble a media log of the required media (Designer's Edge. 12 Steps, 2003, para. 10).
10. Produce Media – Develop a checklist of the required media, who created it, where it is located on the network, etc.
11. Author Course – Export the design into a supported authoring system, RTF compatible word processor, or a database through ODBC. With Net Synergy (another Allen Communication product), the design can also be exported to HTML/Java templates.
12. Evaluate Course – Evaluate the course through the provided tools. Pre-built data collection forms are provided for "alpha and beta test checklists, content gathering, audience surveys, media production and evaluation of course performance in the field" (Designer's Edge. 12 Steps, 2003, para. 13).

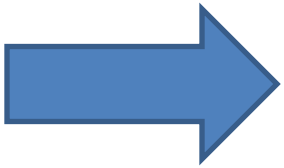
Perencanaan Implementasi IT

Figure 5: Planning Model for Integrating ICTs in TVET



Pengembangan Materi Ajar pbm Matematika

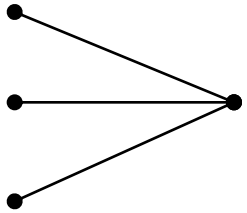
- RPP
- Materi Ajar
- LKS



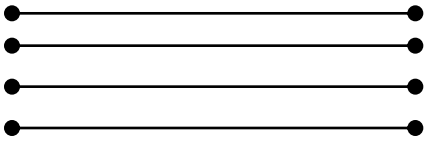
TIK

FUNCTIONS

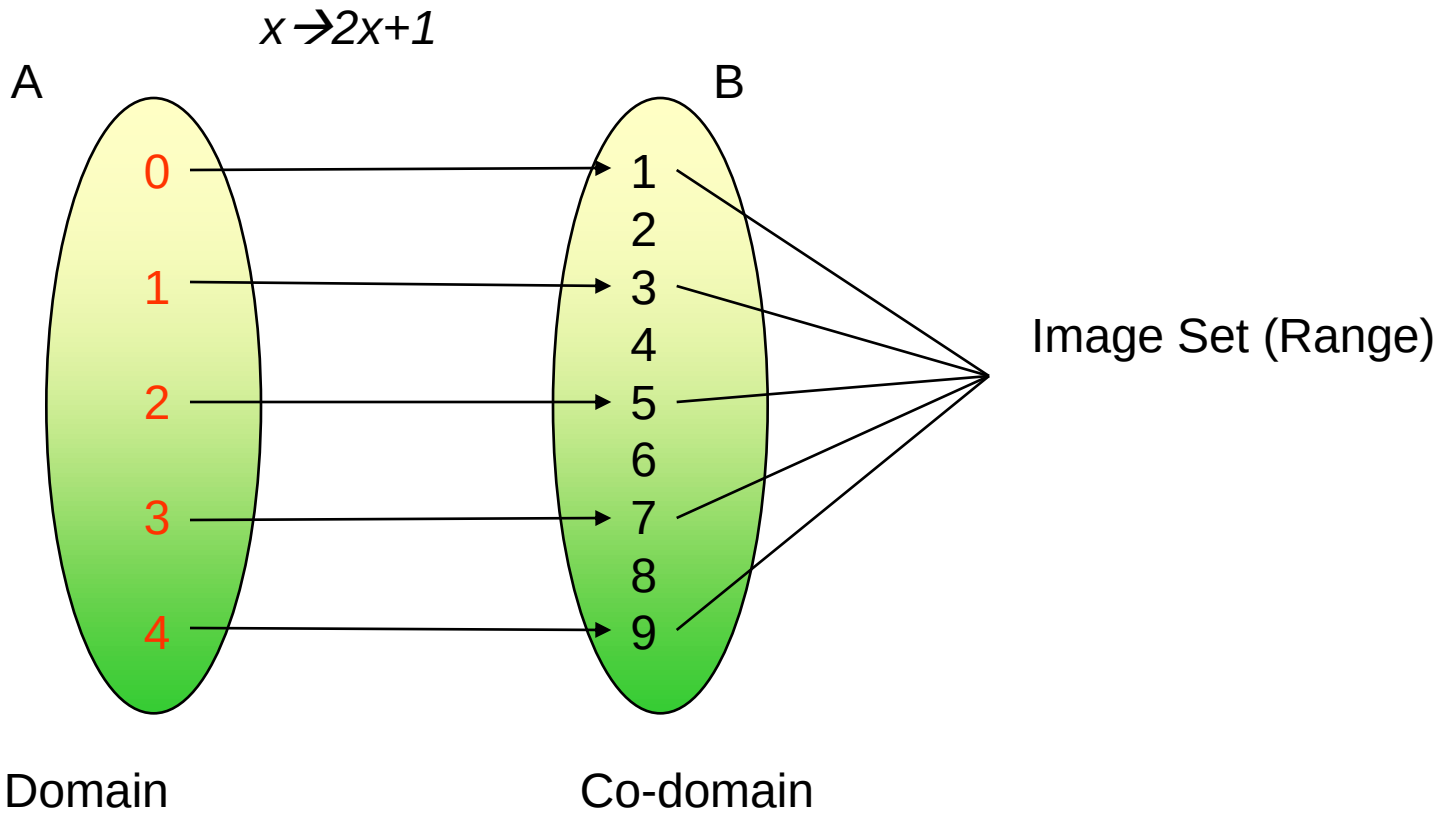
- Many to One Relationship



- One to One Relationship



Function - Domain and Range!



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Functions - Notation

$$f : x \rightsquigarrow x^2 + 4$$

$$f(x) = x^2 + 4$$

The upper function is read as follows:-

'Function *f* such that *x* is mapped onto x^2+4

Lets look at some function Type questions

If $f(x) = x^2 + 4$ *and* $g(x) = 1 - x^2$

$Find\ f(2)$

$Find\ g(3)$

$f(2) = 2^2 + 4$ = 8

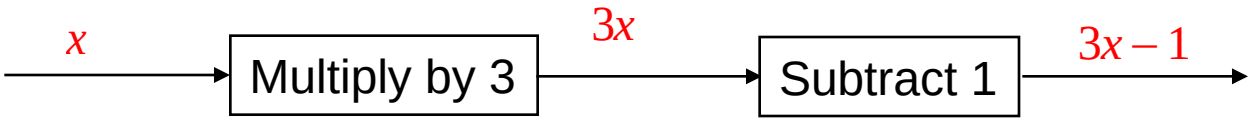
$g(x) = 1 - x^2$ = -8

3 3

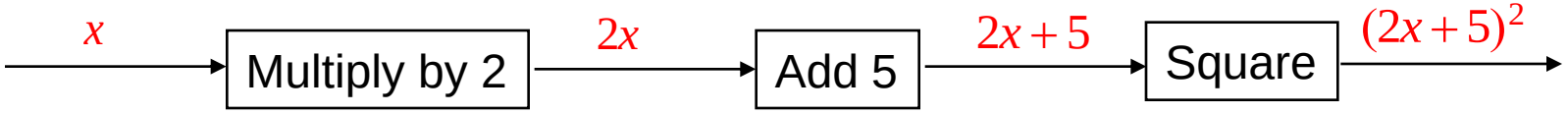
Flow Diagrams

Consider the function $f(x) = 3x - 1$

We can consider this as two simpler functions illustrated as a flow diagram



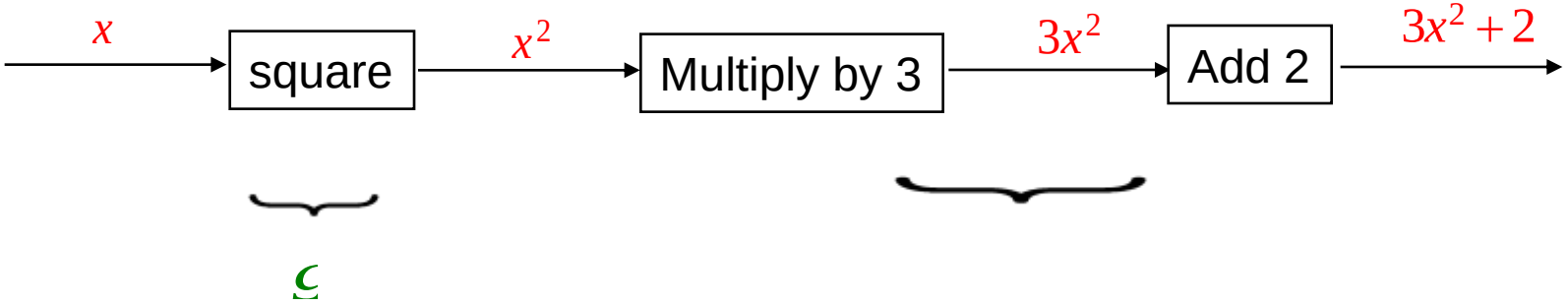
Consider the function $f : x \rightsquigarrow (2x + 5)^2$



Compound(Composite) Functions

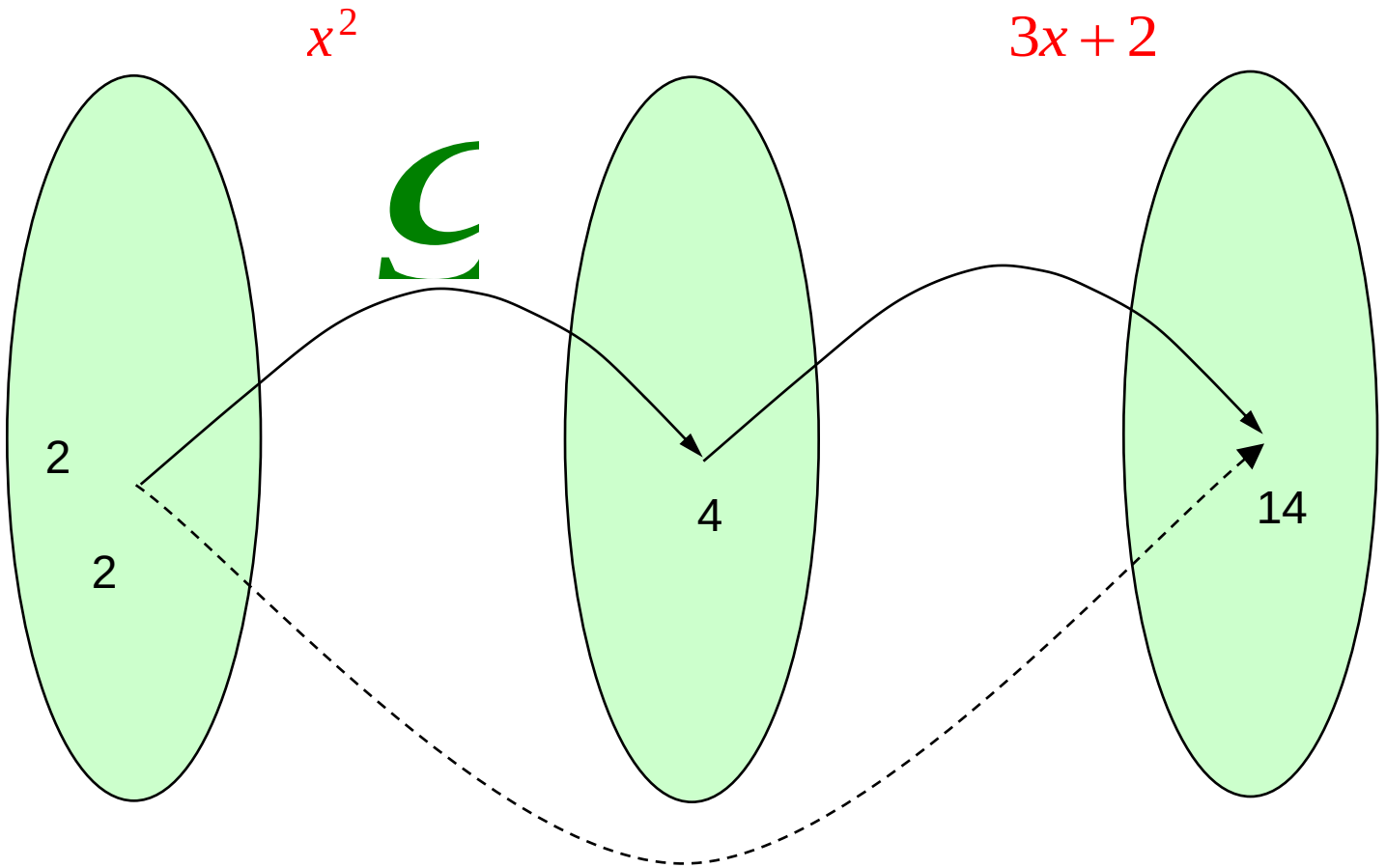
Consider 2 functions $f : x \rightsquigarrow 3x + 2$ and $g(x) : x \rightsquigarrow x^2$

fg is a composite function, where g is performed first and then f is performed on the result of g.
The function fg may be found using a flow diagram



Thus $c = 3x^2 + 2$

Composite Functions - Arrow Diagram



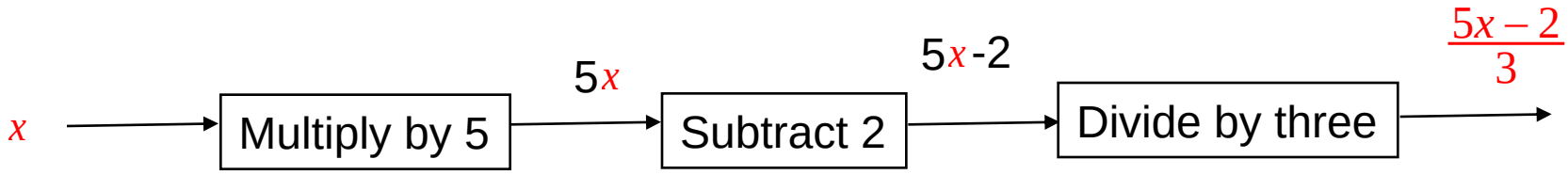
$$g(x)$$

$$3x^2+2$$

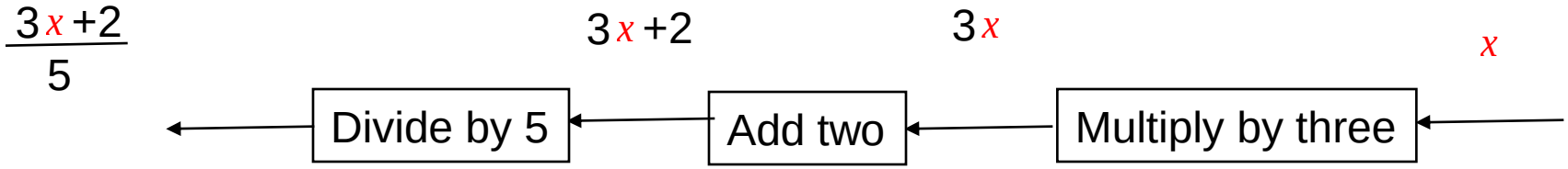
Inverse Functions

Consider the function $f(x) = \frac{5x-2}{3}$

Here is its flow diagram



Draw a new flow diagram in reverse!. Start from the right and go left…



And so $f^{-1}(x) = \frac{3x+2}{5}$

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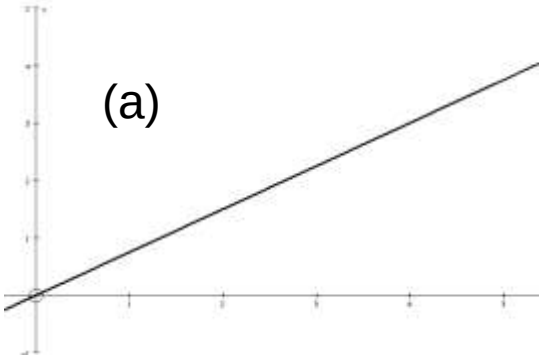
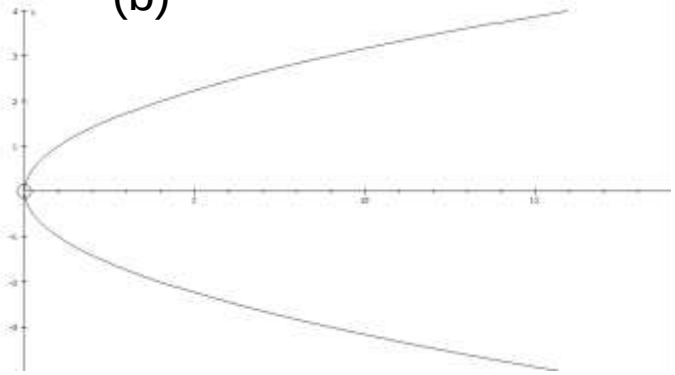
Which Are Functions?

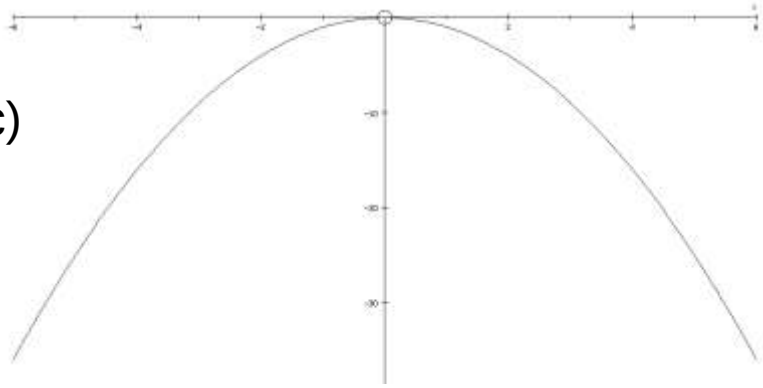
(a)



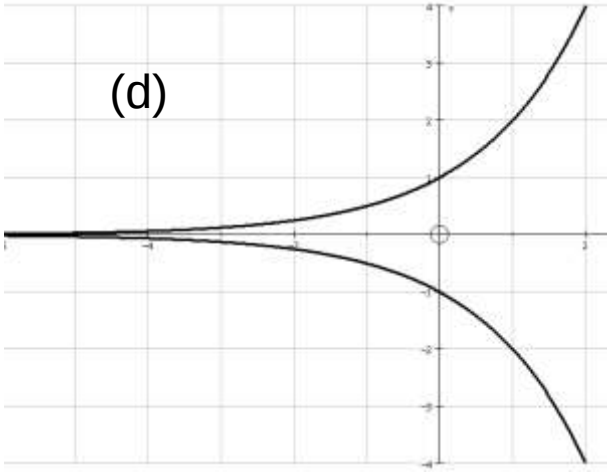
(b)



(c)



(d)



(a) and (c)

Translations

Definitions:

- Transformations: It is a change that occurs that maps or moves a shape in a specific directions onto an image. These are translations, rotations, reflections, and dilations.
- Pre-image: The position of the shape before the change is made.
- Image: The position of the shape after the change is made.
- Translation: A transformation that “slides” a shape to another location.

Translations:

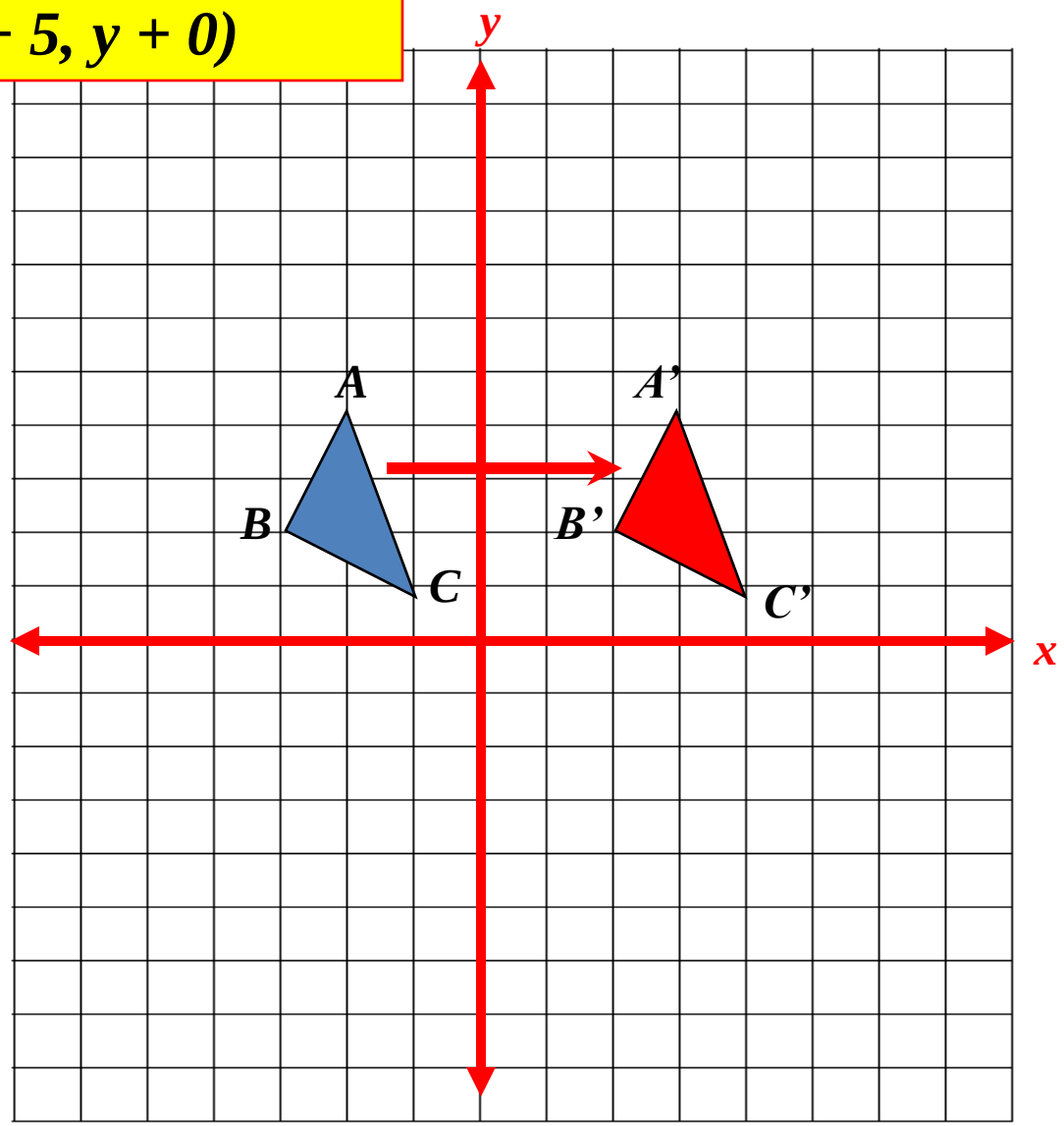
You “slide” a shape up, down, right, left or all the above.

Notation:

$(x, y) \longrightarrow (x + 2,\ y - 3)$

Transformation

$(x, y) \rightarrow (x + 5, y + 0)$



Pre-image

A (-2, 4)

B (-3, 2)

C (-1, 1)

Image

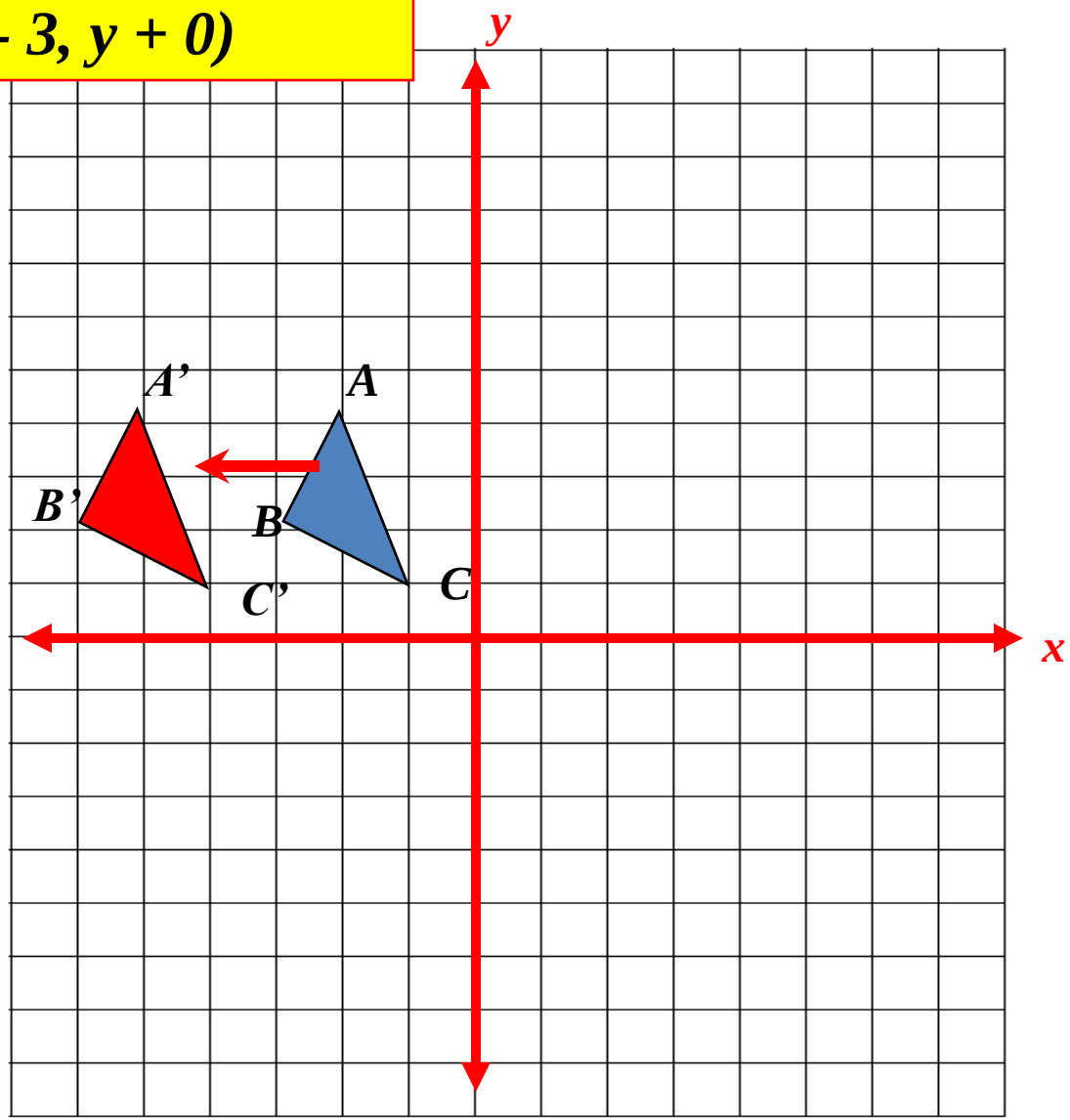
A' (3, 4)

B' (2, 2)

C' (4, 1)

Transformation

$(x, y) \rightarrow (x - 3, y + 0)$



Pre-image

A (-2, 4)

B (-3, 2)

C (-1, 1)

Image

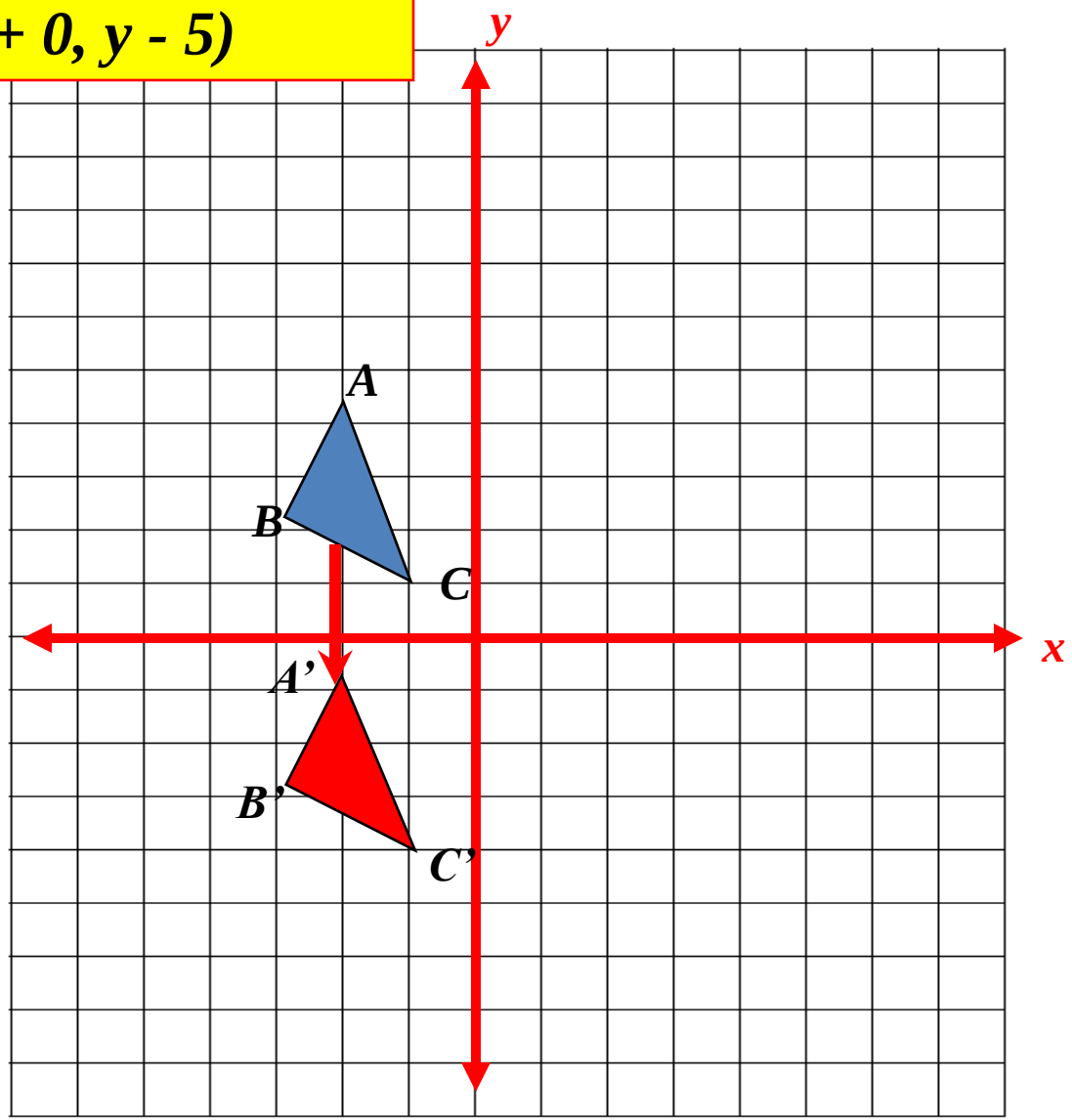
A' (-5, 4)

B' (-6, 2)

C' (-4, 1)

Transformation

$(x, y) \rightarrow (x + 0, y - 5)$



Pre-image

A (-2, 4)

B (-3, 2)

C (-1, 1)

Image

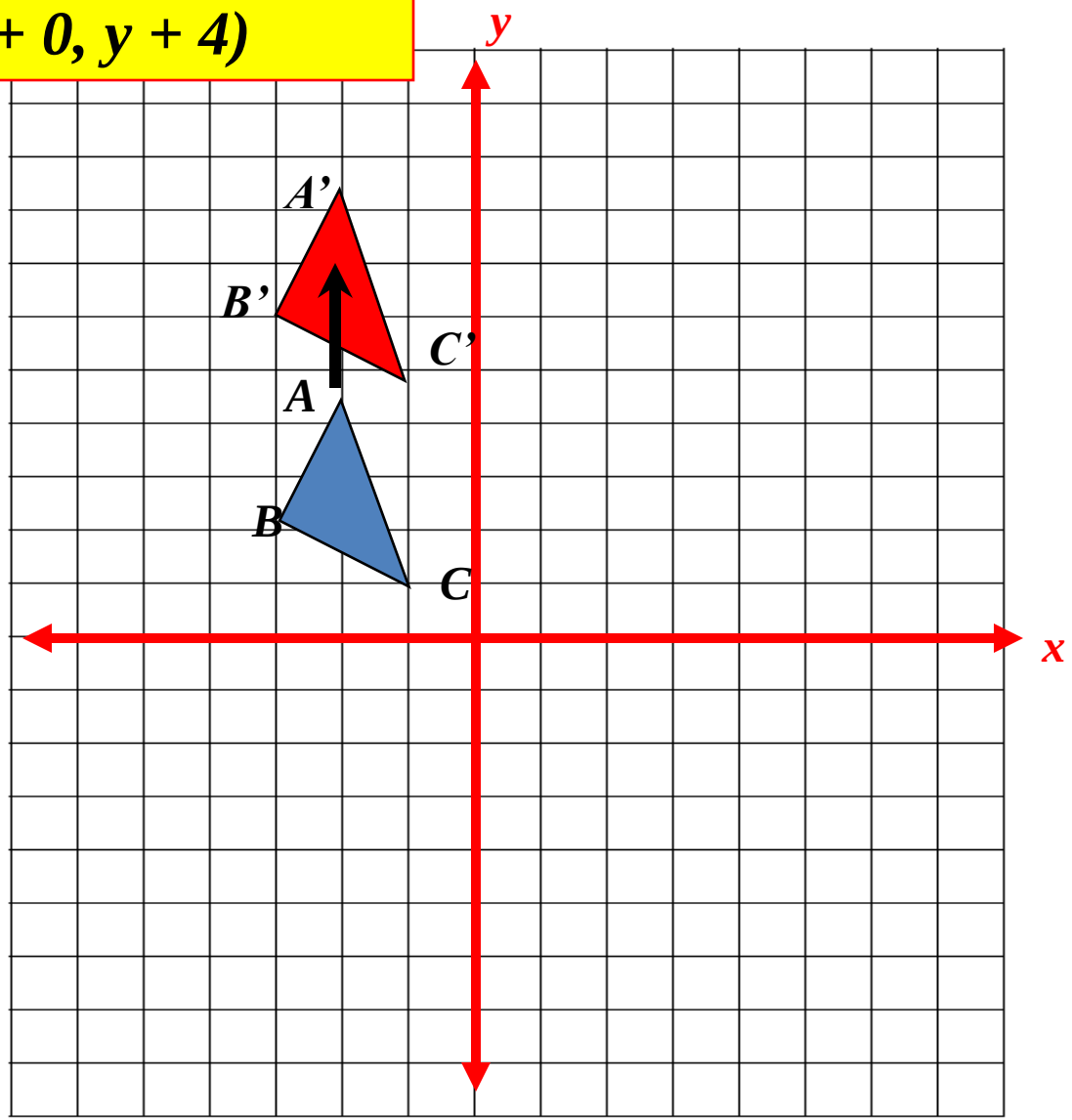
A' (-2, -1)

B' (-3, -3)

C' (-1, -4)

Transformation

$(x, y) \rightarrow (x + 0, y + 4)$



Pre-image

A (-2, 4)

B (-3, 2)

C (-1, 1)

Image

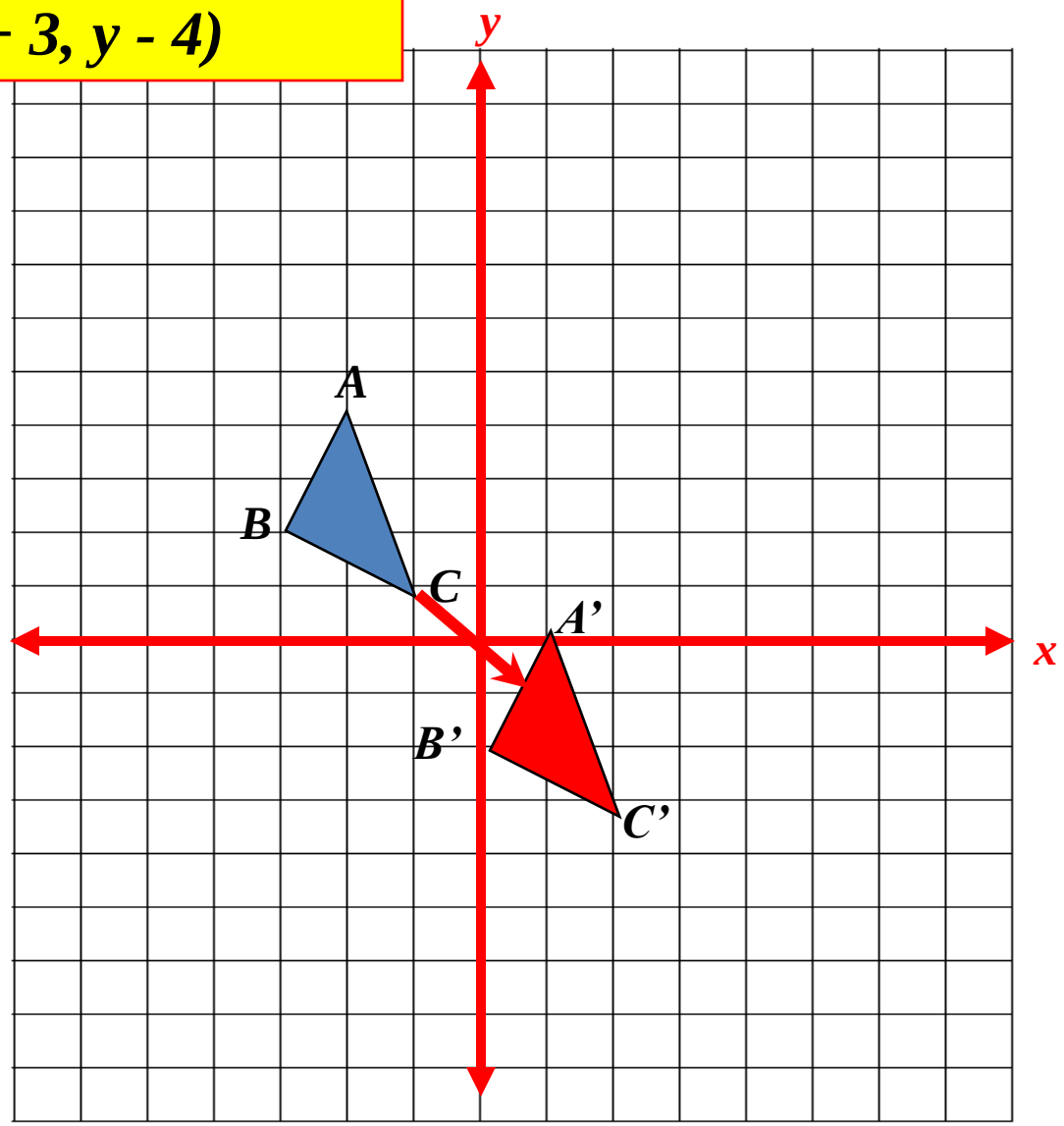
A' (-2, 8)

B' (-3, 6)

C' (-1, 5)

Transformation

$(x, y) \rightarrow (x + 3, y - 4)$



Pre-image

A (-2, 4)

B (-3, 2)

C (-1, 1)

Image

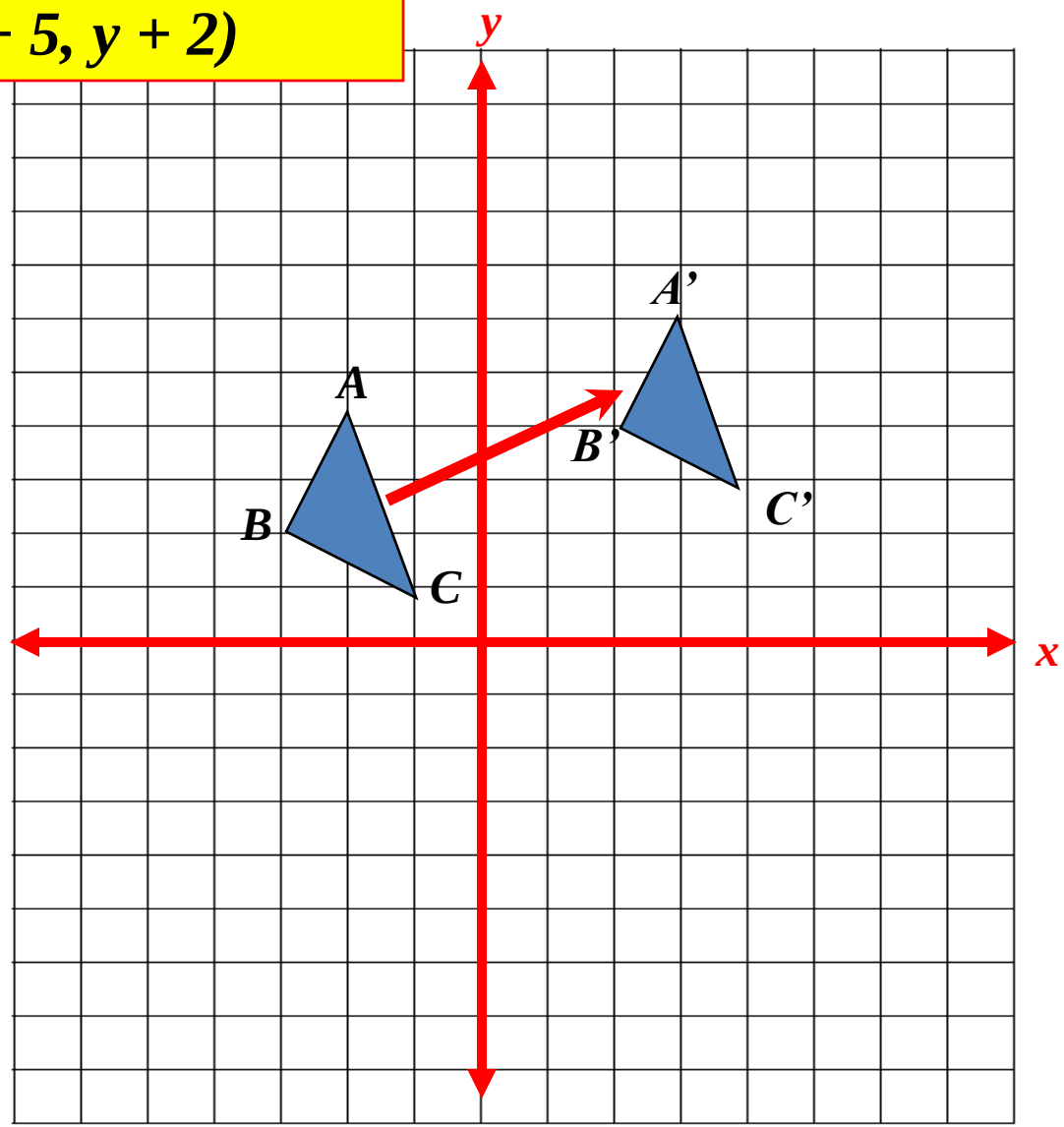
A' (1, 0)

B' (0, -2)

C' (2, -3)

Transformation

$(x, y) \rightarrow (x + 5, y + 2)$



Pre-image

A (-2, 4)

B (-3, 2)

C (-1, 1)

Image

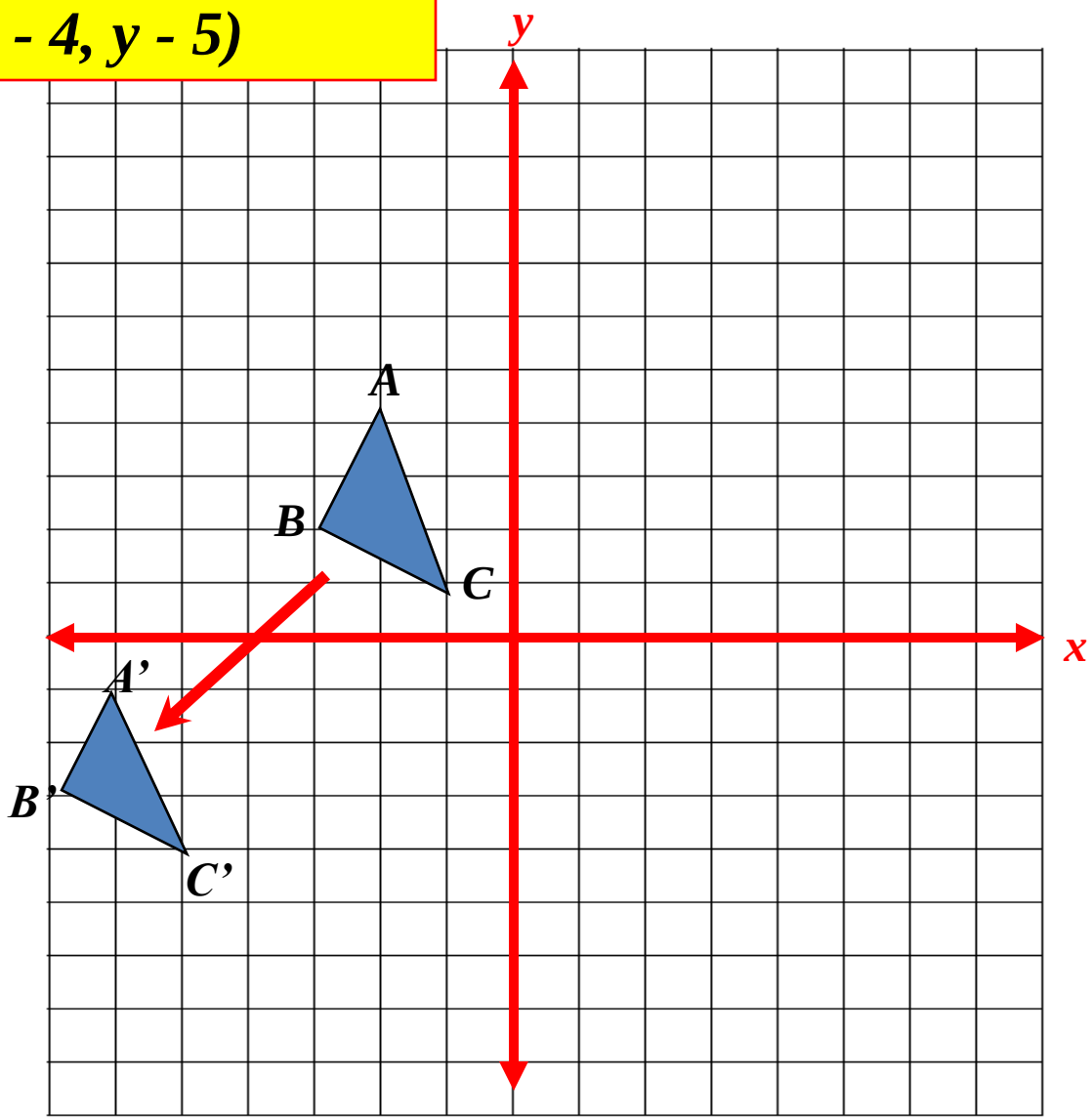
A' (3, 6)

B' (2, 4)

C' (4, 3)

Transformation

$(x, y) \rightarrow (x - 4, y - 5)$



Pre-image

A (-2, 4)

B (-3, 2)

C (-1, 1)

Image

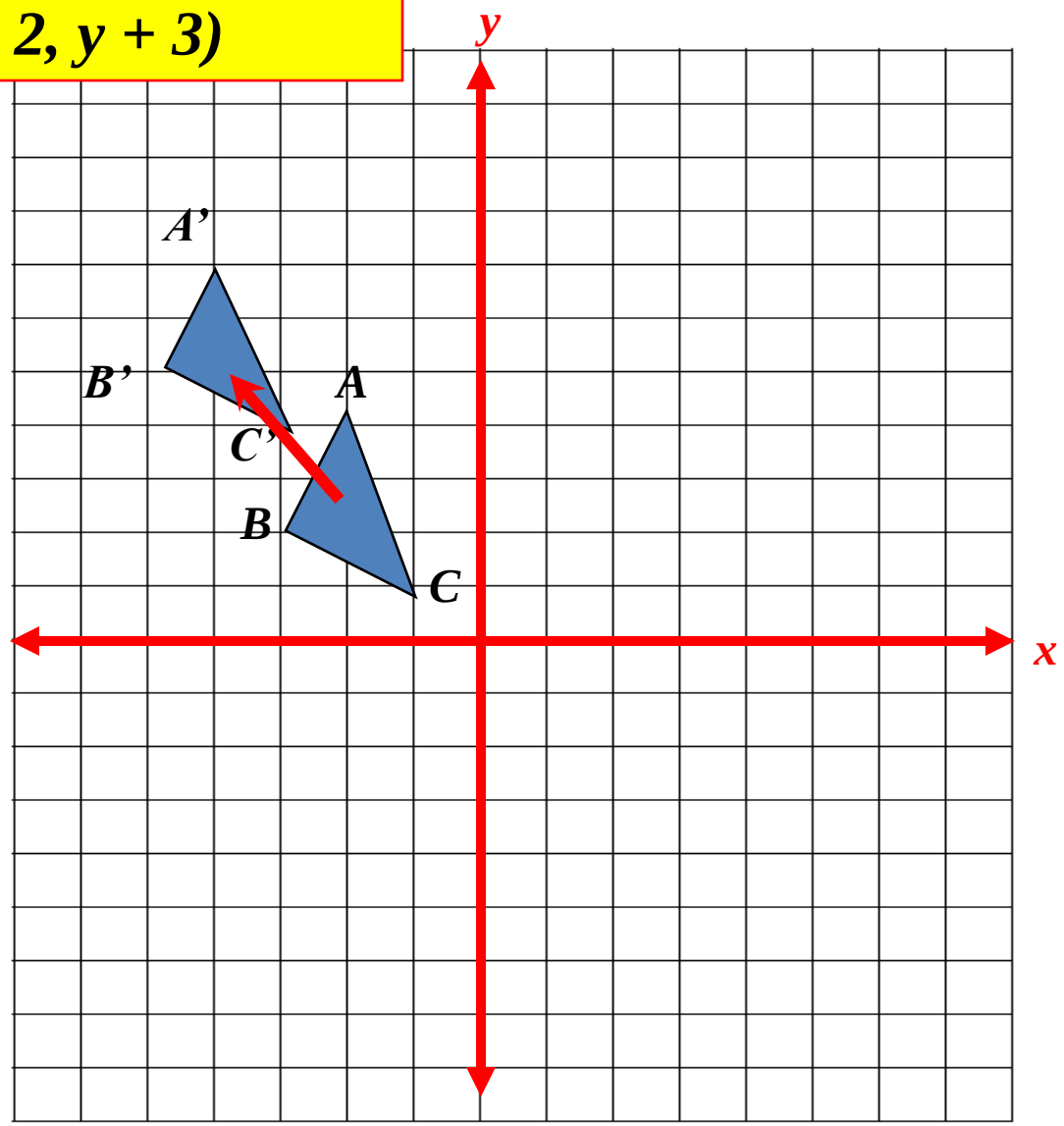
A' (-6, -1)

B' (-7, -3)

C' (-5, -4)

Transformation

$(x, y) \rightarrow (x - 2, y + 3)$



Pre-image

A (-2, 4)

B (-3, 2)

C (-1, 1)

Image

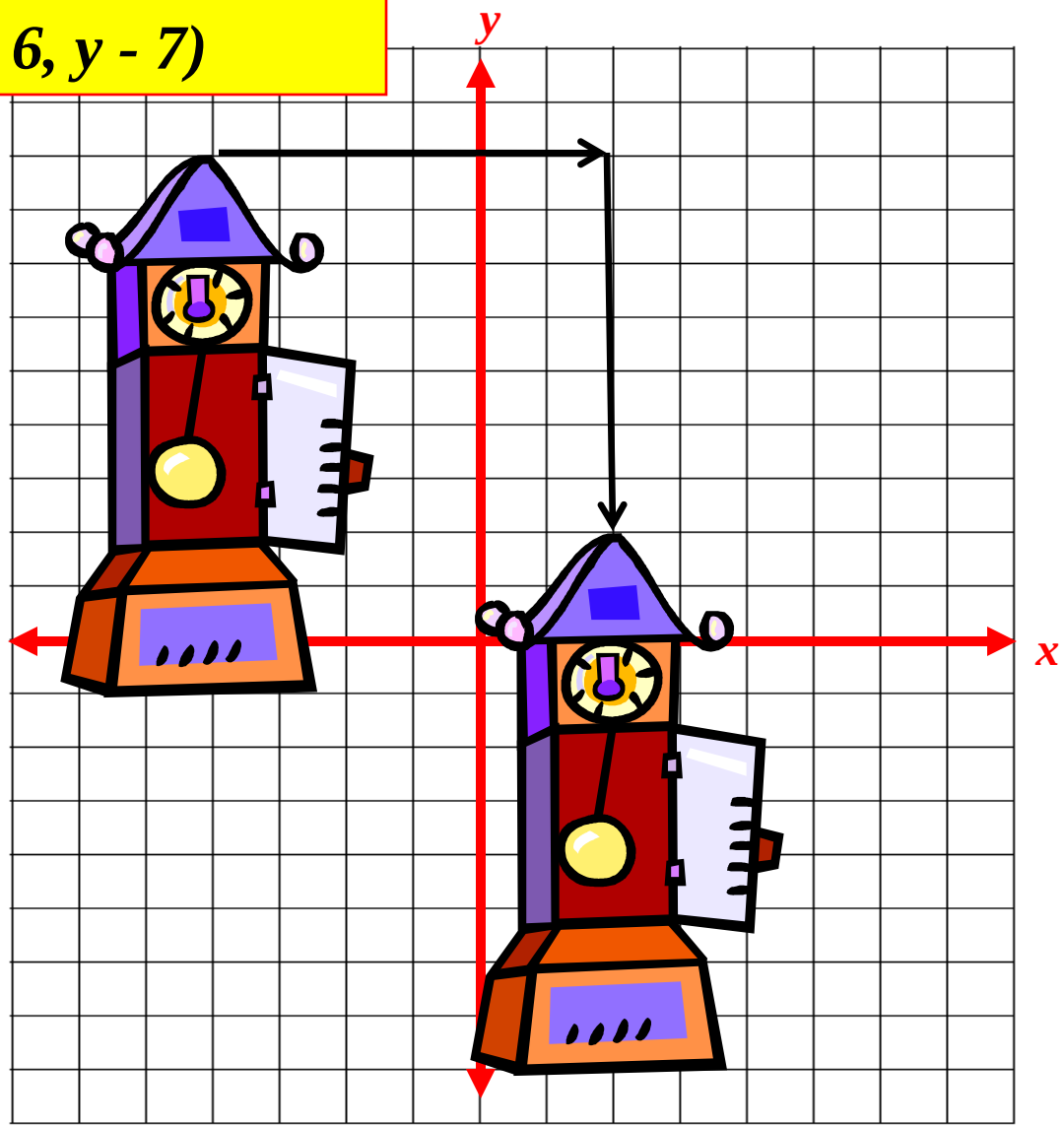
A' (-4, 7)

B' (-5, 5)

C' (-3, 4)

Transformation

$(x, y) \rightarrow (x + 6, y - 7)$



MATRIX

A set of numbers arranged in rows and columns enclosed in round or square brackets is called a matrix.

The order of a matrix gives the number of rows followed by the number of columns in a matrix.

MATRIX

A matrix with an equal number of rows and columns is called a square matrix.

A diagonal matrix has all its elements zero except for those in the leading diagonal (from top to bottom right).

Two matrices are equal if, and only if, they are identical. This means they must be of the same order and the respective elements must be identical.

MATRIX

You can only add or subtract matrices of the same order.

To add, you simply add the corresponding elements in each matrix. To subtract, you subtract the corresponding elements in each matrix.

Scalar multiplication: You can multiply a matrix by a number. Each element of the matrix must be multiplied by the number.

MATRIX

Multiplication of matrices.

It is possible to work out the product of two matrices according to the following rules:

• the number of columns in the first matrix must be equal to the number of rows in the second matrix.

• the order of the product of the matrices is the number of rows in the first matrix multiplied by the number of columns in the second.

• when multiplying, multiply the elements of a row of the first matrix by the elements in a column of the second matrix and add the products.

MATRIX

If A and B are two matrices, then AB is not generally equal to BA. In other words, multiplication of matrices is not commutative.

Determinant of a matrix:

$$If\ A = \begin{pmatrix} a & b \\ c & d \end{pmatrix},\ |A| = ad - bc$$

MATRIX

The inverse of a matrix:

The inverse of a square matrix A is denoted by A^{-1} and

$$\mathbf{A \cdot A^{-1} = A^{-1} \cdot A = I,}$$

where I is the unit matrix of the same order as A.

Tangents of the circle

Presented by

Shivshankar Choudhary

And

Ram Singh

Objectives

- **This presentation explains:**

✓ Types of Tangents.

✓ Construction of tangents.

✓ Construction of incircle.

✓ Construction of circumcircle

This project will help students understand the concept of tangents and how they are constructed.

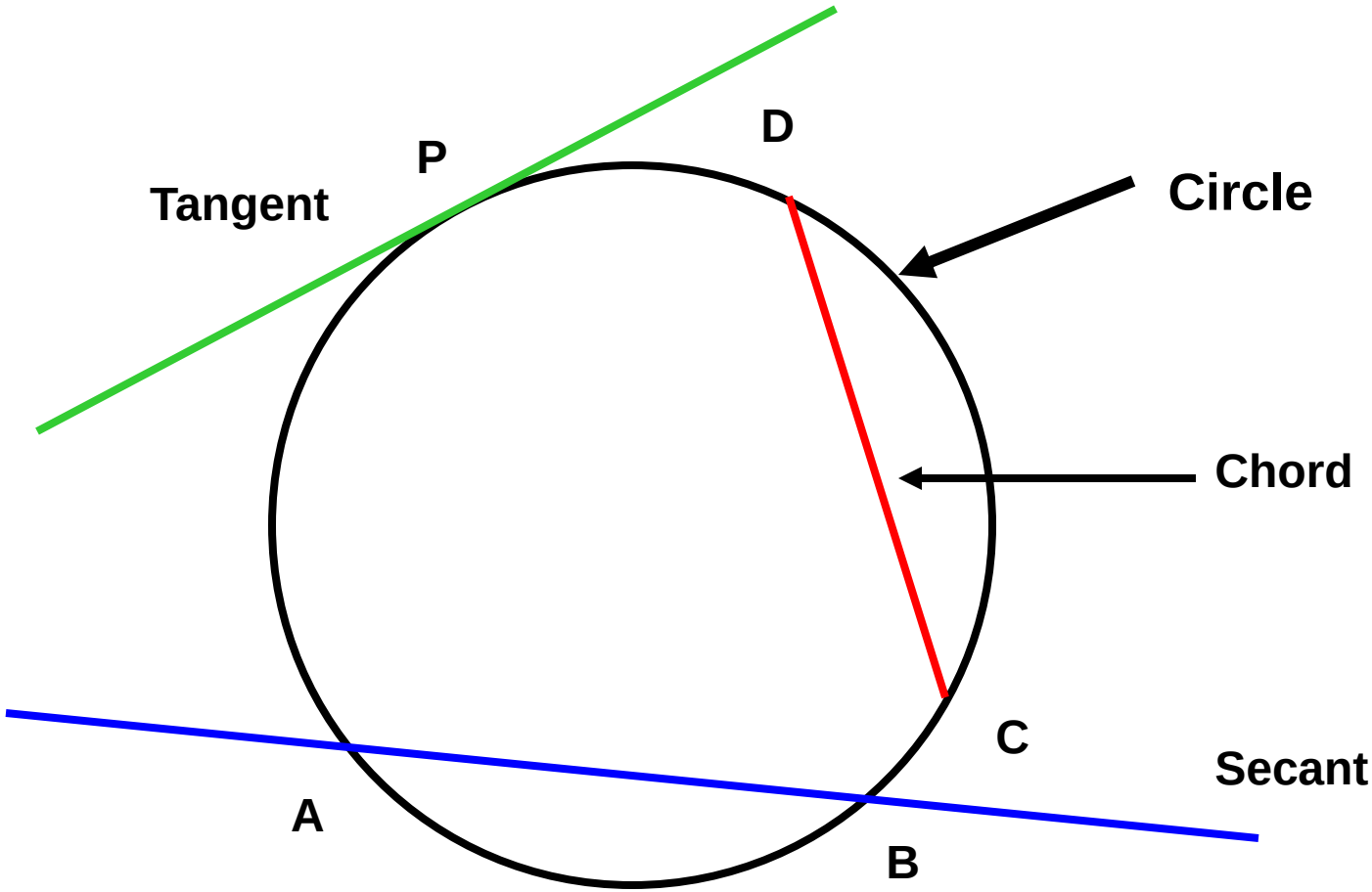
Requireme

- Compass
- Pencils
- Eraser
- Scale
- Set Square

Tangent Chord Secent

- If line touches the circle at one point only that is called a **tangent**
- If line connect the two point at the circle that is called a **chord**
- If line intersect the circle at two point that is called **secant**

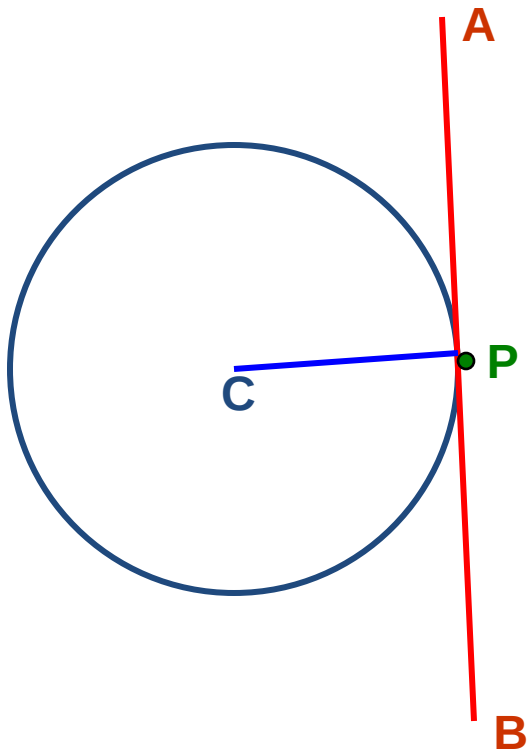
Formation of tangent



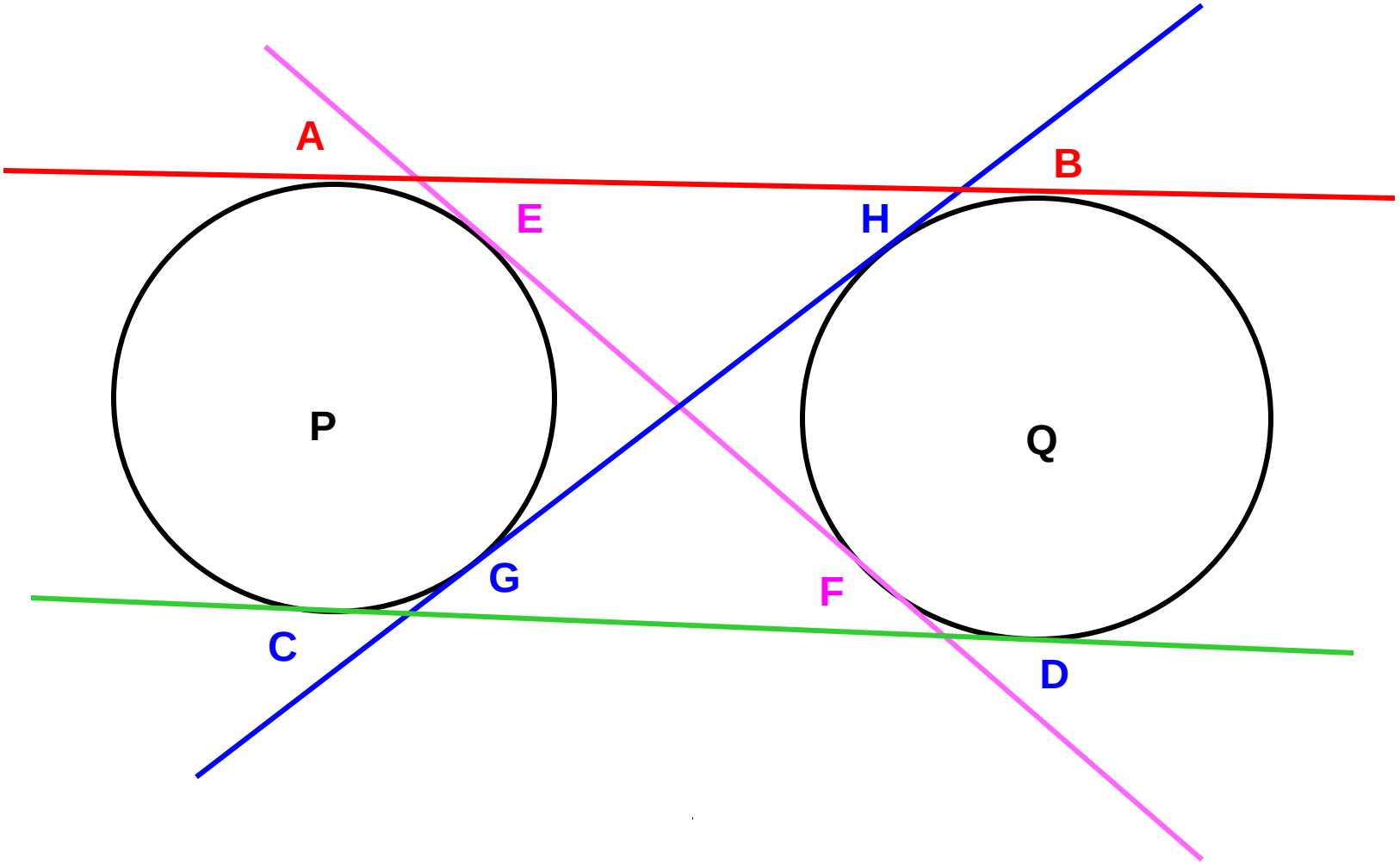
Defination of tangents

APB is called a **tangent** to the circle

The touching point P is called the point of contact.

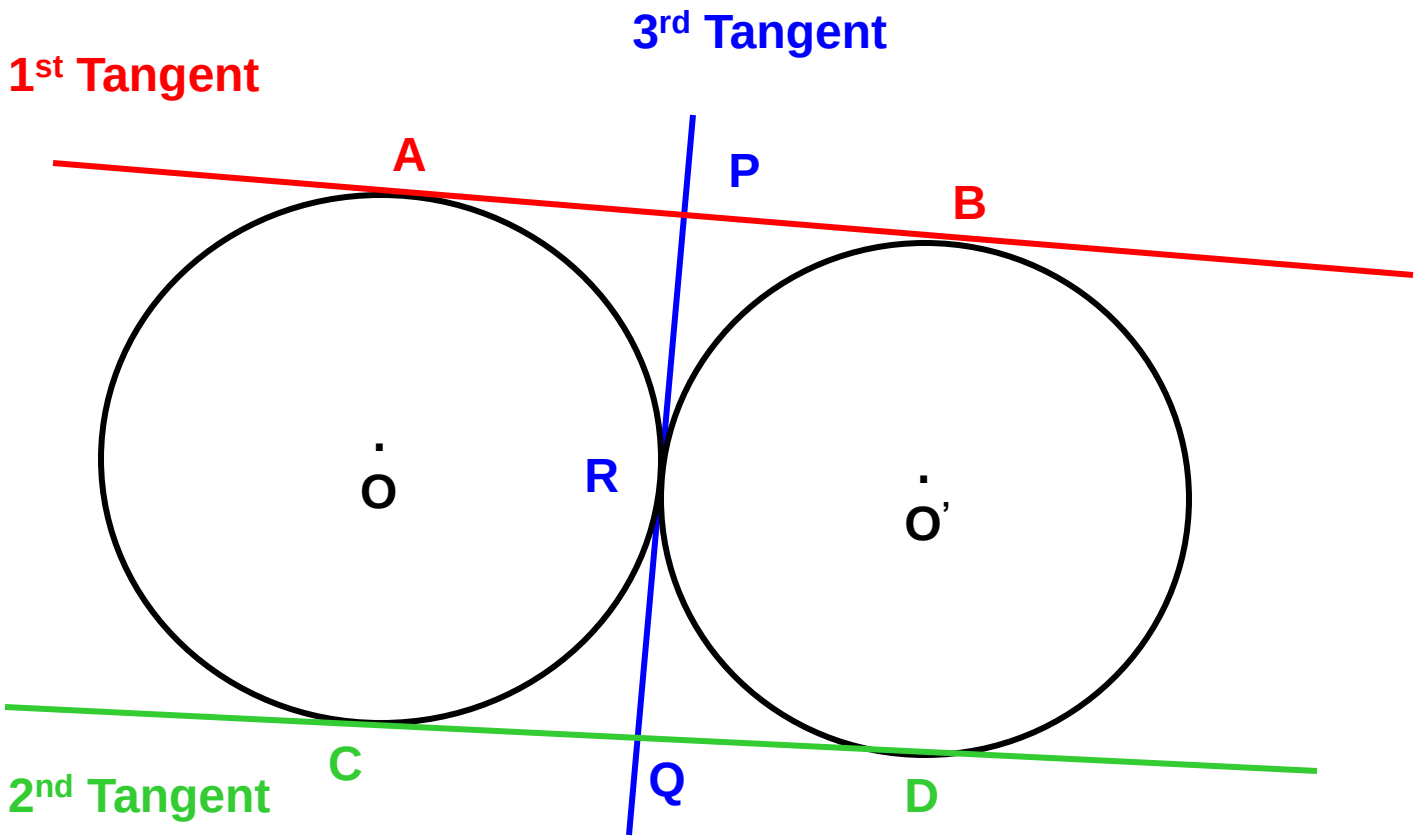


When two circles do not touch



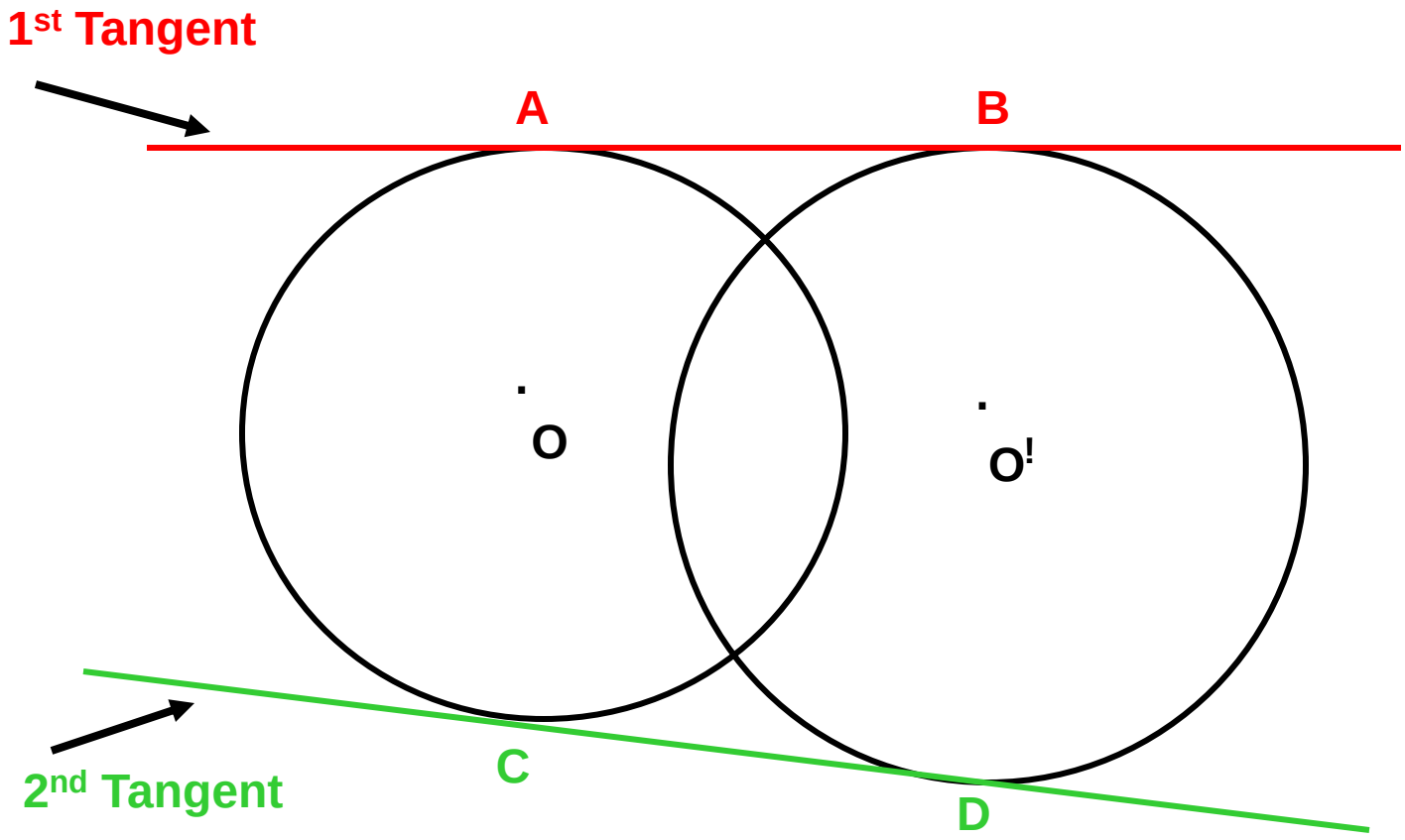
We construct four tangents AB, CD, EF & GH

When two circles touches externally



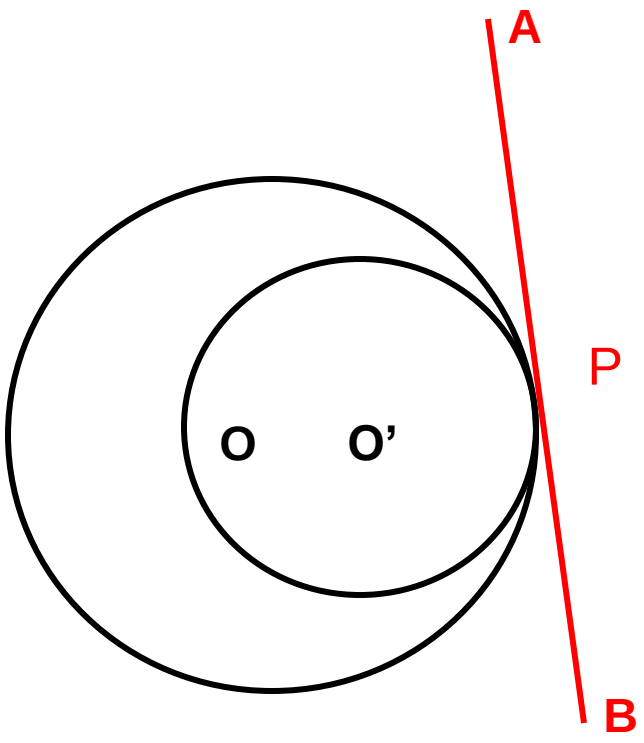
We can construct three tangents APB, CQD, PRQ

When two circles intersect each other



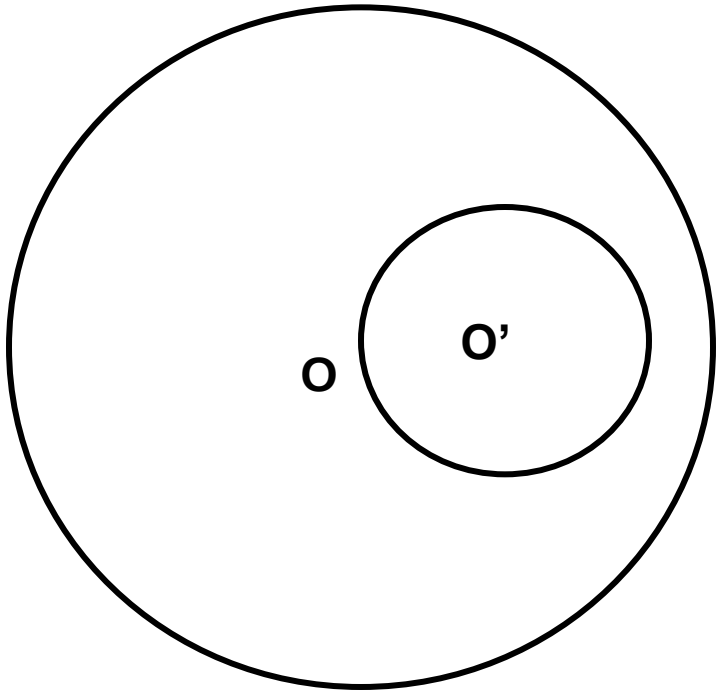
We can construct two tangents AB, CD

When two circles touches internally



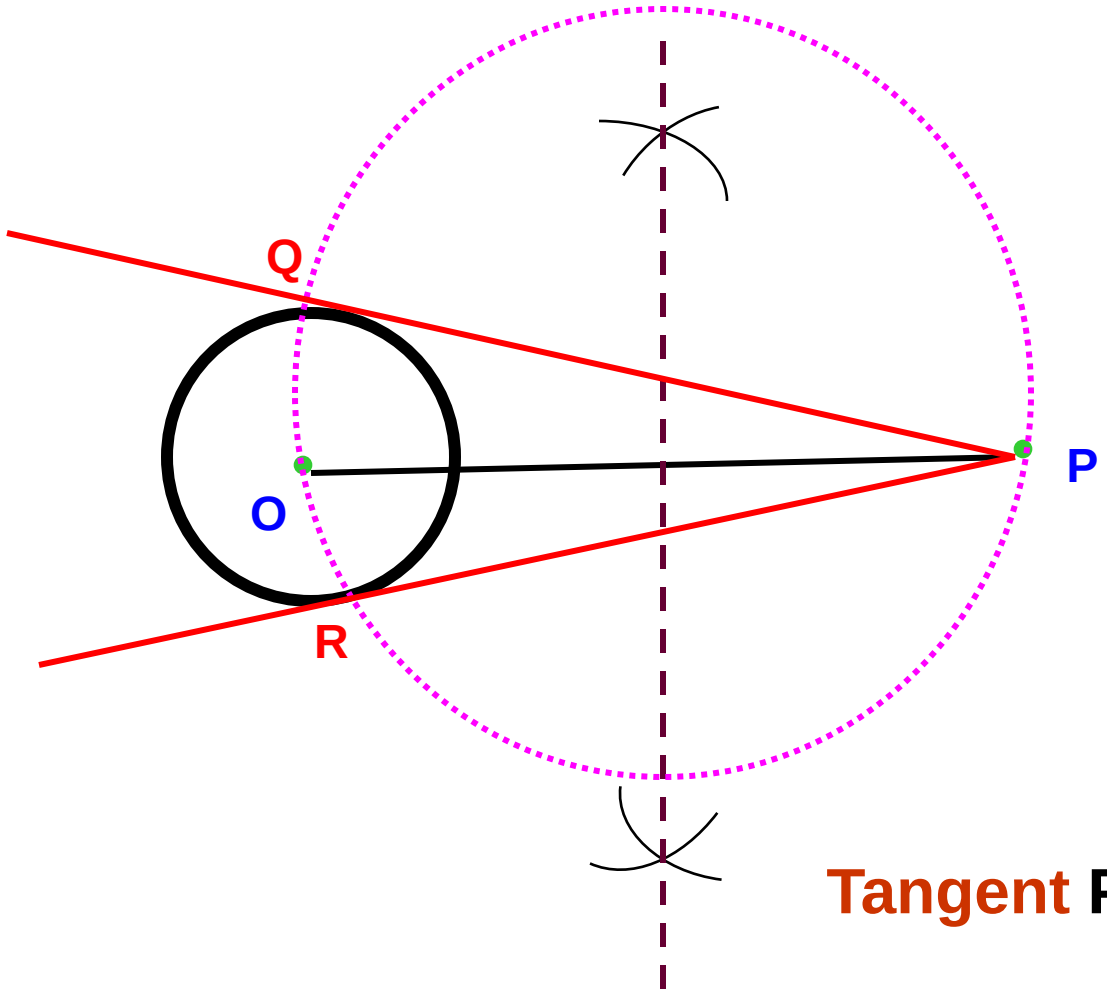
We can construct only one tangents APB

When two concurrent circles



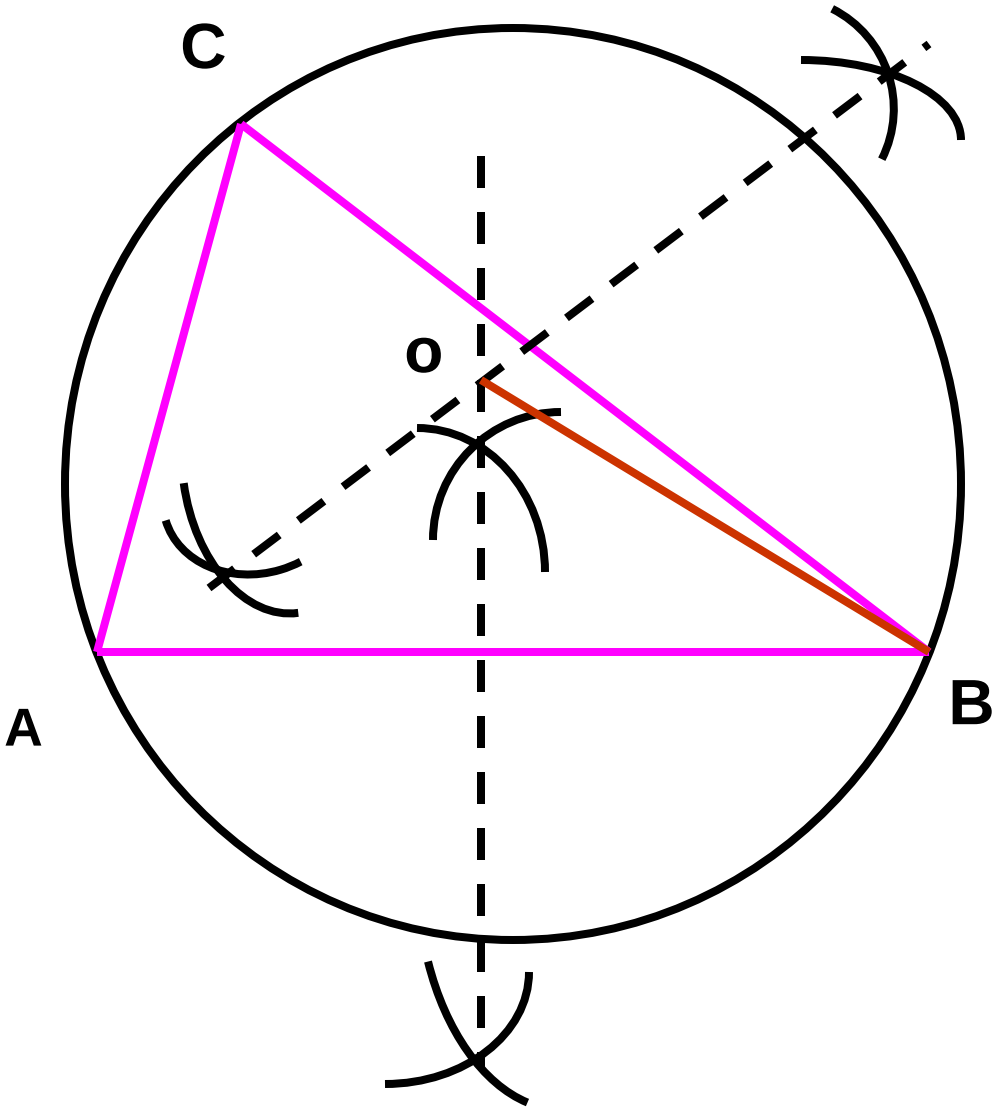
We can not construct any common tangent

P is a point out side the circle you can construct two tangents passing through P



Tangent PQ = TangentPR

Constructing Circumcircle



Steps of Construction

Construct a Δ ABC

Bisect the side AB

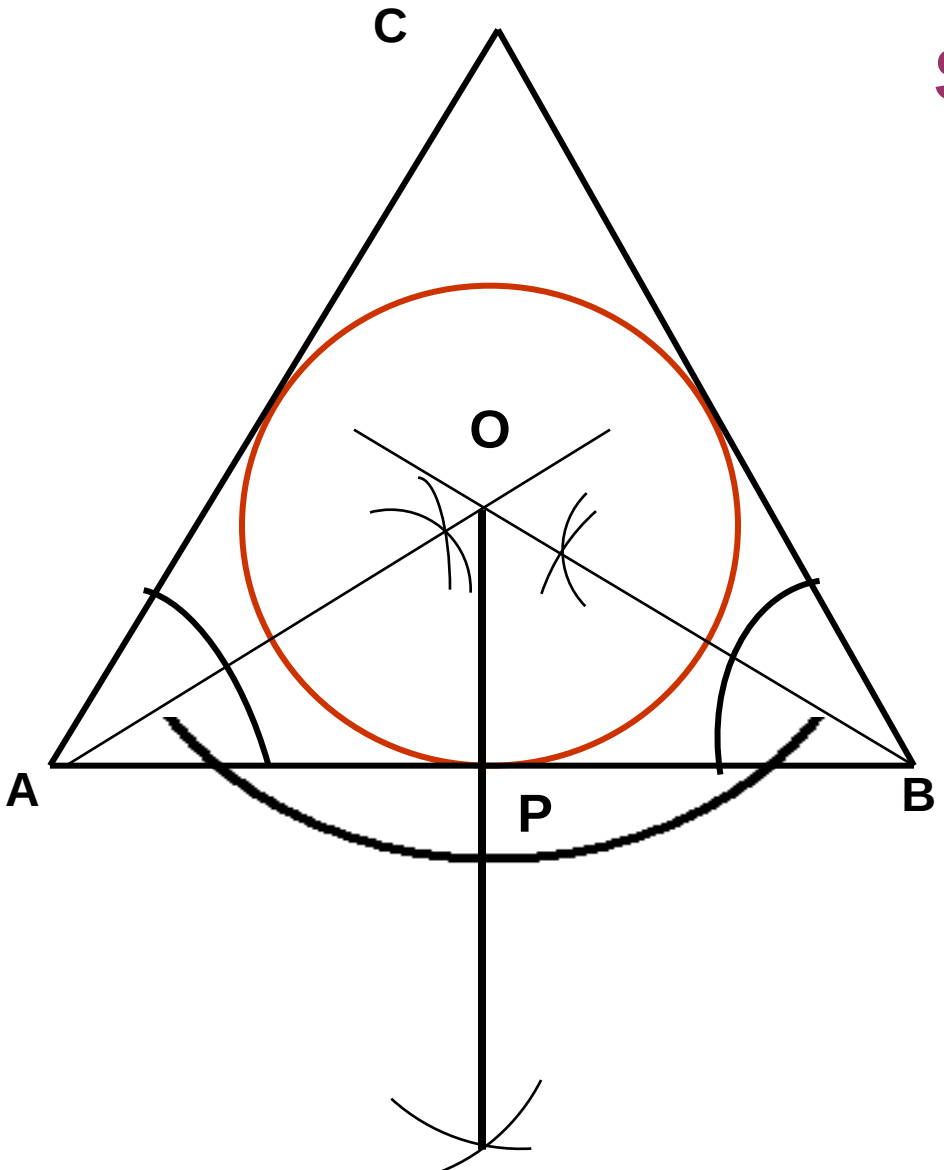
Bisect the side BC

The two lines meet at O

From O Join B

Taking OB as radius
draw a circumcircle.

Constructing of incircle



Steps of construction

Construct a Δ ABC

Bisect the ∠ BAC

Bisect the ∠ABC

The two lines meet at O

Taking O draw OP ⊥ AB

Taking OP as radius

Draw a circumcircle

Acknowledgment

Thanks to Prasenjeet sir

Microsoft IT Academy

Govt. of Rajasthan

Educational Software to Enhance Your Classroom

ANDREA HENDRICKS & CALANDRA DAVIS
ASSOCIATE PROFESSORS OF MATHEMATICS
GPC ONLINE

Goals

- Share free or low-cost software that will allow you to
  - Create documents and web pages
  - Provide electronic annotation
  - Create screen captures/videos
  - Provide other web animations and interaction
- Share web sites with techniques for teaching math, data, and other invaluable information

Document creation for Print & the Web

- Worksheets
- Study Guides
- Exam Reviews
- Lecture Notes
- Websites

Sample Documents

Finding the x-intercept

Example. Find the x-intercepts of the graph of $f(x) = x^2 - 5x + 6$, and then sketch a graph of the function.

Solution:

Let's set $f(x)=0$ and solve for x by factoring.

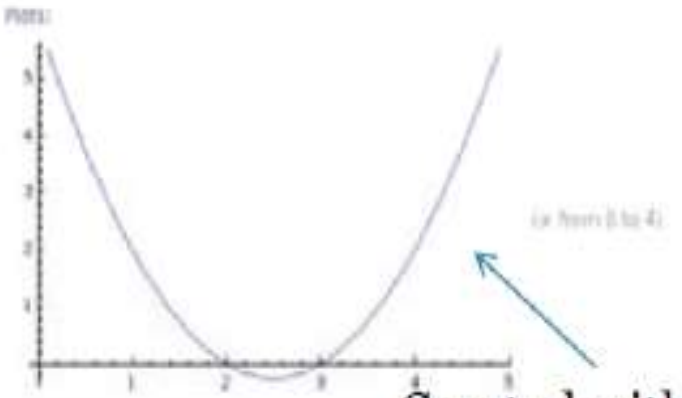
$x^2 - 5x + 6 = 0$

$(x - 3)(x - 2) = 0$

$x - 3 = 0 \Rightarrow x = 3$ OR $x - 2 = 0 \Rightarrow x = 2$

So, the x-intercepts of the graph of f(x) are (3, 0) and (2,0).

Graph of $f(x) = x^2 - 5x + 6$



Created with Cool Text

Created with Wolfram Alpha

2.1 The Derivative

Review of Slope from Algebra

Consider the line that passes through the point (2, 1) with slope 3. Use this information to sketch a graph of the line.

Suppose a company's total profit from selling x cases can be modeled by the linear equation $P = 25x - 150$

(a) What is the slope of this line? _____
(b) Explain the meaning of the slope in the context of the problem.

Unfortunately most equations that model real-world applications are not linear. So we need a way to describe the rate of change (slope) of nonlinear functions.

Average Rate of Change

The average rate of change of a function $f(x)$ as x changes from $x = c$ to $x = c + h$ is just the slope of the line between the points _____ and _____ represented by the x-values.

Rate _____ =

The average rate of change can also be interpreted as the slope of the _____ line.

Reminder: In calculus, we are just finding the slope between 2 points, just like we did in algebra.

Learning Objectives:
1. Review slope concept from algebra
2. Define the derivative
3. Calculate the derivative using the definition
4. Solve applications involving the derivative

Example. Let $f(x) = x^2$. Compute the slope of the secant line joining the points on the graph of f whose x-coordinates are $x = 1$ and $x = 5$.

Sample Documents

Finding the x-intercept

Example. Find the x intercepts of the graph of $f(x) = x^2 - 5x + 6$, and then sketch a graph of the function.

Solution:

Let's set $f(x) = 0$ and solve for x by factoring.

$x^2 - 5x + 6 = 0$

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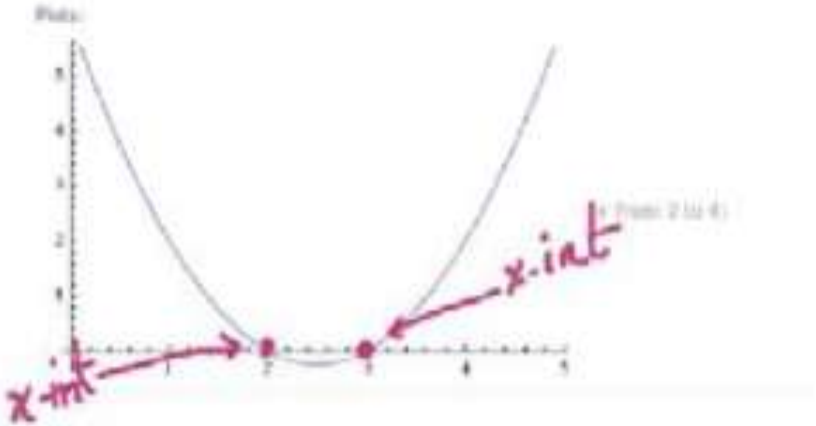
Graph of $f(x) = x^2 - 5x + 6$



2.1 The Derivative

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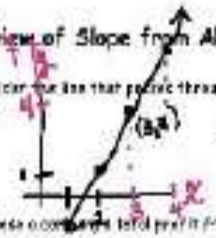
Consider the line that passes through the point (3, 1) with slope 3. Use this information to sketch a graph of the line.



(x_1, y_1) & (x_2, y_2)

$\text{slope} = m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{\Delta y}{\Delta x} = \frac{3 \leftarrow \text{up}}{1 \leftarrow \text{right}}$

Suppose a company's total profit (in dollars) from selling x cakes can be modeled by the linear equation $P = 250x - 50$.

(a) What is the slope of this line? 250

(b) Explain the meaning of the slope in the context of the problem.

$\frac{\Delta y}{\Delta x} = \frac{\Delta P}{\Delta x} = \frac{\Delta \text{ total profit}}{\Delta \text{ cakes}} = 250$

The company is making a profit of $250/cake.

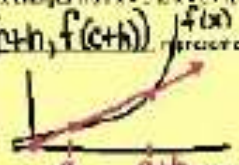
$y = mx + b$ (slope, y-int.)

Unfortunately, most equations that model real-world applications are not linear. So, we need a way to determine the rate of change (slope) of nonlinear functions.

Average Rate of Change

The average rate of change of a function f(x) as x changes from $x = c$ to $x = c + h$ is just the slope of the line between the points $(c, f(c))$ and $(c+h, f(c+h))$, represented by the expression

$\text{Ave}_{\text{rate}} = \frac{f(c+h) - f(c)}{c + h - c}$



The average rate of change can also be interpreted as the slope of the secant line.

Remember: In essence, we are just finding the slope between 2 points, just like we did in algebra.

Learning Objectives

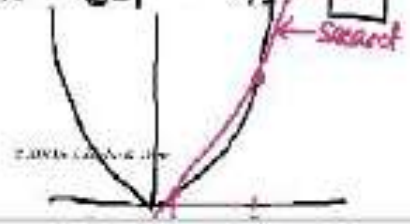
1. Review slope concept from algebra
2. Define the derivative
3. Calculate the derivative using the definition
4. Solve applications involving the derivative

Example. Let $f(x) = x^2$. Compute the slope of the secant line joining the points on the graph of f whose x-coordinates are $x = 1$ and $x = 5$.

$(1, f(1))$, $(5, f(5))$

$(1, 1)$, $(5, 25)$

$\text{slope of secant line} = \frac{25 - 1}{5 - 1} = \frac{24}{4} = \boxed{6}$



Screen Capturing

- Jing by TechSmith
  - Captures images on screen with animation and voice
  - Up to 5 minutes for free, Swf file
  - For longer videos and formats, use JingPro ($15/yr)
  - Available at http://www.jingproject.com
  - Sample video
- Windows Media Encoder (www.microsoft.com/downloads and search for above)
- Screen Toaster
  - Available at www.screentoaster.com
  - Requires no plug-ins

Web Animation & Interaction

Vokis

- Animated avatars for announcements
- Up to 60 seconds for free
- Embed in web pages or iCollege, emails
- Available at www.voki.com
- Sample

Web Animation & Interaction

- Etherpad
  - Allows for simultaneous creation of a document
  - Available at etherpad.com
  - Demonstration

Additional resources

- The Big List
  - http://educationalsoftware.wikispaces.com/The+Big+List
- Mathematics WWW Virtual Library
  - http://www.math.fsu.edu/Virtual
- Teaching College Math Blogs/Websites
  - http://teachingcollegemath.com
  - http://frank.mtsu.edu/~smcdanie/CSS_Site/VisualAlgebra/TeachingTecHomeSLC.htm

Additional Resources

- Free Online Graph Paper
  - http://incompetech.com/graphpaper/
- Online Graphing Calculators
  - Winplot – available at http://math.exeter.edu/rparris/winplot.html
- Wolfram Alpha
  - Available at www.wolframalpha.com
- Wolfram Demonstrations Project
  - Thousands of interactive visualizations at www.demonstrations.wolfram.com
  - Must download a *Mathematica* Player
- Population data from Google (by state, county)
  - Shows graph and data points
  - Multiple models shown at once

Additional Resources

- TED

www.ted.com

- Big Think (videos, searchable):
  www.bigthink.com

- HippoCampus

www.hippocampus.org

www.math.hippocampus.org

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RATING

★★★★

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$2,495

Reviewed by Richard Karel, University of Tennessee, Knoxville

- Powerful and flexible development tool
- Large user base
- Significant investment

According to Trivantis, Lectora is used in 59% of the Fortune 100 companies and in more than 60 countries. As a one-person online learning department with over eight years of

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- Screen Camera
- Video Editor and Audio Recorder and Editor
- Image Editor

Math: Calculus

Absolute Maximum and Minimum

Objectives

Students will be able to:

- Interpret the graph of a function.
- Relate the process of finding maxima and minima to the graphs themselves.
- Find the absolute maximum and minimum of a function on different domains.

Warm-Up

After having discussed the process of finding the absolute maximum and minimum by finding the derivative and testing at the endpoints yesterday, the goal today is to understand why this process is used. Have students take five minutes to write down an educated guess as to why we set the derivative equal to zero in order to find maxima and minima.

Warm-Up

After having discussed the process of finding the absolute maximum and minimum by finding the derivative and testing at the endpoints yesterday, the goal today is to understand why this process is used. Have students take five minutes to write down an educated guess as to why we set the derivative equal to zero in order to find maxima and minima.

Lesson

• Explain and reinforce the idea that the derivative is the slope of the tangent line, so that it is logical that the derivative is zero at a maximum or minimum.

• Student activity: Graph the following pairs of functions using W|A.

◇ $f(x) = x^3 + x^2 - 8x + 5,\ f'(x)$

◇ $f(x) = \sin(x),\ f'(x)$

◇ $f(x) = 3x^3 - 2x,\ f'(x)$

Make a logical guess as to what x values give the maxima and minima of each function. At those x values, what is the value of $f'(x)$?

WolframAlpha computational knowledge engine

x^3+x^2-8x+5, derivative x^3+x^2-8x+5

Input interpretation:

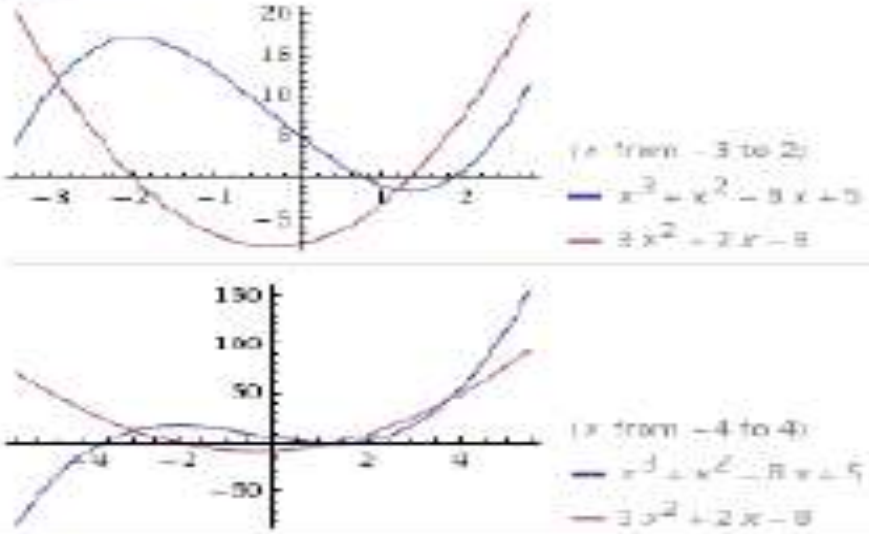
$$\left\{x^3 + x^2 - 8x + 5,\ \frac{\partial(x^3 + x^2 - 8x + 5)}{\partial x}\right\}$$

Mathematica form

Result:

$$\left\{x^3 + x^2 - 8x + 5,\ 3x^2 + 2x - 8\right\}$$

Plots:



Now use the methods learned to find the absolute maximum and minimum on the domain [−5, 5] for each of the three functions.

- Use WolframAlpha to check your answers.

WolframAlpha computational... knowledge engine

maximum x^3+x^2-8x+5, x from -5 to 5

Input interpretation:

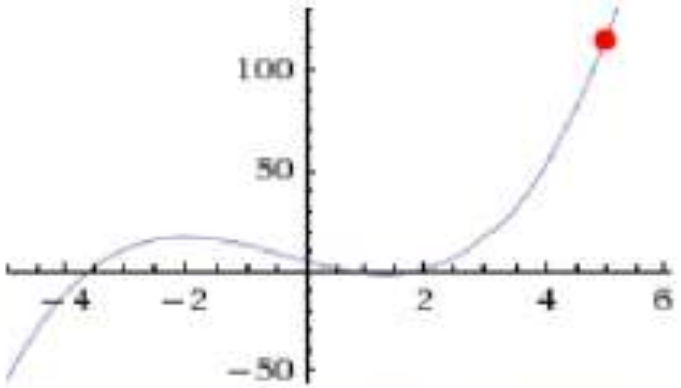
Mathematica form

maximize	function	$5 - 8x + x^2 + x^3$
	domain	$-5 \le x \le 5$

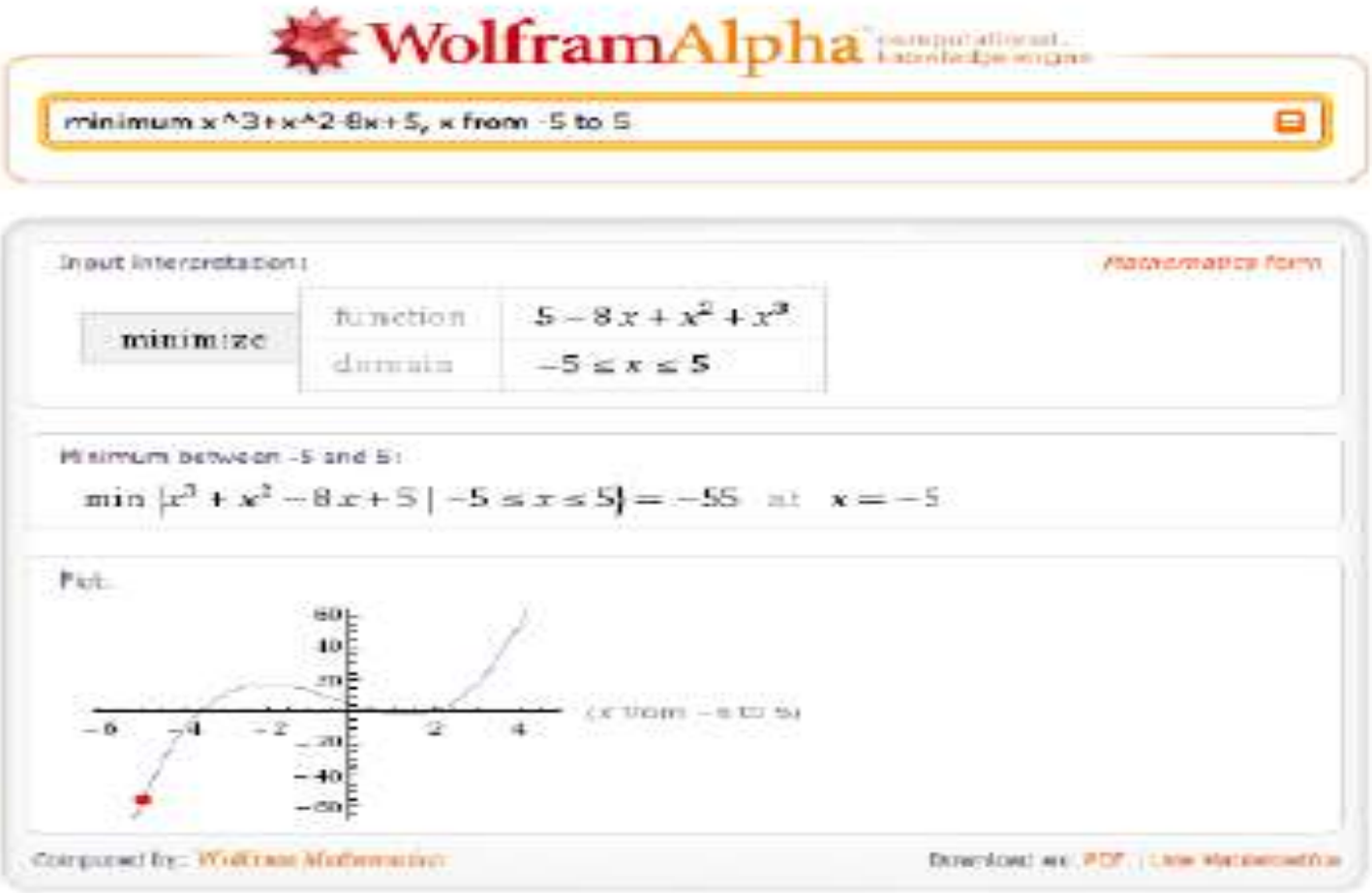
Maximum between -5 and 5:

$$\max\left(x^3 + x^2 - 8x + 5 \mid -5 \le x \le 5\right) = 115 \quad \text{at} \quad x = 5$$

Plot:



(x from -5 to 6)



• Tell students to choose a function. Find the maximum and minimum on the domain [-10, 10], and graph the function as well as its derivative using Wolfram|Alpha.

Closing

Fill in the blank of this sentence on a piece of paper. When a function has a maximum or minimum on an infinite domain, the derivative is _____.

Selamat Berjuang