
Pair Work: Think/Pair/Share

MATHEMATICS Grades 10 - 12

In this strategy, students individually consider an issue or problem and then discuss their ideas with a partner.

Purpose

- Encourage students to think about a question, issue, or reading, and then refine their understanding through discussion with a partner.

Payoff

Students will:

- reflect on subject content.
- deepen understanding of an issue or topic through clarification and rehearsal with a partner.
- develop skills for small group discussion, such as listening actively, disagreeing respectfully, and rephrasing ideas for clarity.

Tips and Resources

- Use Think/Pair/Share in all math strands for any topic.
- Use it to help students read and understand a problem [e.g., direct students to complete a KMWC (*Know/Model/Words/Cross out*) chart (see *Most/Least Important Idea(s) or Information*) then share their work with a partner].
- Once a problem has been understood, this strategy can be used to help in the problem solving process (see Student/Teacher Resource, *Think/Pair/Share – Sample Starters*).
- This strategy can be used for relatively simple questions and for ones that require more sophisticated thinking skills, such as hypothesizing. Use it at any point during a lesson, for very brief intervals or in a longer time frame.
- Use it to activate prior knowledge, understand a problem, or consolidate learning.
- Take time to ensure that all students understand the stages of the process and what is expected of them.
- Review the skills that students need to participate effectively in *Think/Pair/Share*, such as good listening, turn-taking, respectful consideration of different points of view, asking for clarification, and rephrasing ideas.
- After students share in pairs, consider switching partners and continuing the exchange of ideas.
- See Student/Teacher Resource, *Think/Pair/Share – Possible Starters*.
- See other strategies, including *Take Five* and *Discussion Web* (Oral Communication strategies in *Think Literacy: Cross-Curricular Approaches, Grades 7-12, 2003*) for ways to build on this strategy. *Teaching Reading in Social Studies, Science, and Math*, pp. 266-269. *Beyond Monet*, pp.94, 105.

Further Support

- Some students may benefit from a discussion with the teacher to articulate their ideas before moving on to share with a partner. Interview those students who require additional support to scaffold their thinking so that they are prepared to pair share.
- Provide criteria for what effective thinking, pair sharing, and small group or additional pairing look, sound, and feel like. Such criteria includes details about active listening (e.g., one voice at a time, eyes looking at the speaker, nodding to show that you heard what they said); taking turns (e.g., first one person shares and the other listens, and then reverse roles); monitoring sharing time (e.g., 2 minutes, identifying start and stop time).

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MATHEMATICS Grades 10 - 12

What teachers do	What students do
<p>Before</p> <ul style="list-style-type: none"> • Think about the different purposes of the <i>Think/Pair/Share</i> activity: to activate prior knowledge; to think about ideas first and then share with other students for feedback; to pace student thinking and discussion; to include all students in developing a plan for solving a problem; to share a solution to a math problem; to analyze and compare solutions to a math problem. • Consider the social and academic goals for the <i>Think/Pair/Share</i> activity, and plan for pairing of particular learners who would further those goals. • Demonstrate with students the actions and time frame that students use during a <i>Think/Pair/Share</i>. 	<ul style="list-style-type: none"> • Follow the actions of Think (think and write individually) Pair (share ideas with a partner) Share (share what you heard from your partner with another pair of students or a small group). • Use <i>Think/Pair/Share</i> for any of these purposes at the 'Before' part of a lesson, given the teacher's prompts: to solve a problem from the previous day's lesson; to describe a mathematical concept, skill, or strategy used in the previous day's lesson or homework; to preview and identify key features and ideas from the text to be used in the lesson.
<p>During</p> <ul style="list-style-type: none"> • Ask students to spend several minutes thinking about and writing down ideas (e.g., as a review of previous learning; to describe a mathematical concept; to brainstorm ideas for making a plan to solve a problem). • Identify expectations regarding the mathematical focus of the student thinking (e.g., criteria for active listening, taking turns, and monitoring time for sharing). • Organize students in pairs to share, clarify their ideas and understanding, and ask questions. • Monitor the focus, quality, and amount of student dialogue through observation and interview. 	<ul style="list-style-type: none"> • Use <i>Think/Pair/Share</i> to formulate thoughts and ideas about: the key concepts, skills, and/or strategies learned from a previous lesson; the making of a plan for solving a math problem; a solution to a math problem; analysis and comparison of solutions for a math problem. • Record thoughts and ideas in written form (e.g., phrases, diagrams, charts, mathematical symbols) as preparation for sharing with a partner. • Practise effective active listening, taking turns, and monitoring time skills when learning in pairs and small groups, using techniques such as paraphrasing what the other has said, asking for clarification, revising and restating own ideas, waiting for others to stop sharing, watching clock for equitable sharing time.
<p>After</p> <ul style="list-style-type: none"> • Call upon some pairs to share their learning and ideas with the whole class. • Possibly extend the <i>Think/Pair/Share</i> with a further partner trade, where students swap partners and exchange ideas again. • Consider adding a journal writing activity as a productive follow-up to a <i>Think/Pair/Share</i> activity. 	<ul style="list-style-type: none"> • Pinpoint any information that is still unclear after the pair discussion, and ask the class and teacher for clarification.

Notes






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MATHEMATICS Grades 10 - 12

- Take about 5 minutes to jot down things you remember about ___ (e.g., Pythagorean Theorem, graphing a line, slope, using a graphing calculator, the properties of similar triangles).
- Describe ___ including a worked example. [e.g., the relationship for calculating the surface area of a pyramid; trigonometric ratios (i.e., sine, cosine, tangent)].
- What is the difference between ___ and ___ (e.g., the instructions *describe* and *justify*)?
- What is the same and what is different between ___ and ___ (e.g., 1st degree and 2nd degree equations)?
- Think about different ways that you can ___ (e.g., model a first-degree equation with one variable using algebra tiles, paper and pencil, a balance scale).
- You are going to look at a diagram on the overhead for a few moments. Then I will cover the diagram and ask you to individually write things that you remember about the diagram.
- Look at the table of values and the graph of a parabola. Identify the key features of a graph of a parabola.
- How are scatter plot data on a line graph different than on a parabola?
- Think about the math problems we solved over the last few days. Summarize the relationship between two linear relations when there is a point of intersection. Show your ideas using an algebraic and graphic method.

Sample Think/Pair/Share Process for Problem Solving:

<p>Step 1: Think</p> 	<p>Individually think about the following (3-5 minutes):</p> <ul style="list-style-type: none"> • What information do you need to solve the problem? • What information do you already know? • What tools and strategies could you use? • What questions do you need to ask your group?
<p>Step 2: Pair</p> 	<p>With a partner, jot down ideas to help you get started with the problem (2-3 minutes). You may use any of the tools provided in the classroom, including calculators to help with estimating.</p>
<p>Step 3: Share</p> 	<p>Take turns sharing ideas in a larger group (3-4 minutes).</p>
<p>Step 4:</p>	<p>Decide on the first strategy your group would like to apply to solve the problem. Record other possible strategies. You may want to revise your plan as you work through the problem.</p>
<p>Step 5:</p>	<p>The person with _____ shares your favoured strategy with the whole class.</p>




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MATHEMATICS Grades 10 - 12

Sample Starters for Individual Thinking before Pairing:

- Think of three things you know about ___ (e.g., forms of taxation, using a spreadsheet to determine the value of investments, calculating interest for a loan, difference between fixed and variable costs).
- Take about 5 minutes to jot down things you remember about ___ (e.g., owning or leasing a vehicle, simple and compound interest, features and conditions of short-term loans for cars, line of credit).
- Describe ___ including a worked example (e.g., discounts, simple interest, gross and net pay, payroll deductions – pension plan, employment insurance, union dues, income tax).
- What is the difference between ___ and ___ (e.g., the instructions *identify* and *calculate*)?
- What is the same and what is different between ___ and ___ (e.g., salary and commission pay)?
- Think about different ways that you can ___ (e.g., make a decision about the purchase of an item).
- You are going to look at a diagram on the overhead for a few moments. Then I will cover the diagram and ask you to individually write things that you remember about the diagram.
- Read the text about risk tolerance and highlight any words or phrases that require clarification and further explanation.
- Think about the “making change” problems we solved in class over the last few days. Summarize some mental math strategies you learned to calculate change.

Sample Think/Pair/Share Process for Problem Solving:

<p>Step 1: Think</p> 	<p>Individually think about the following (3-5 minutes):</p> <ul style="list-style-type: none"> • What information do you need to solve the problem? • What information do you already know? • What tools and strategies could you use? • What questions do you need to ask your group?
<p>Step 2: Pair</p> 	<p>With a partner, jot down ideas to help you get started with the problem (2-3 minutes). You may use any of the tools provided in the classroom, including calculators to help with estimating.</p>
<p>Step 3: Share</p> 	<p>Take turns sharing ideas in a larger group (3-4 minutes).</p>
<p>Step 4:</p>	<p>Decide on the first strategy your group would like to apply to solve the problem. Record other possible strategies. You may want to revise your plan as you work through the problem.</p>
<p>Step 5:</p>	<p>The person with _____ shares your favoured strategy with the whole class.</p>




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Sample Starters for Individual Thinking before Pairing:

- Think of three things you know about ___ (e.g., simple iterative processes, permutation and combination problems, databases, network problems, factorials, use of Fathom® software).
- Take about 5 minutes to jot down things you remember about ___ (e.g., binomial distribution, sampling bias and variability, difference between cause-effect relationships and correlation).
- Describe ___ (e.g., situations that give rise to U-shaped, exponential, skewed, bimodal situations). What is the difference between ___ and ___ (e.g., the instructions *solve* and *simplify*)?
- What is the same and what is different between ___ and ___ (e.g., measures of central tendency)?
- Think about different ways that you can ___ (e.g., simulate a situation for which the calculation of the theoretical probability is difficult or impossible).
- You are going to look at a diagram of Pascal’s triangle on the overhead for a few moments. Then I will cover the diagram and ask you to individually write things that you remember about the diagram.
- Read the set of instructions and highlight any that you don’t understand.
- Think about the permutation problems we did in class over the last few days. Summarize the additive and multiplicative counting techniques. Explain the advantages of using these techniques for particular situations.

Sample Think/Pair/Share Process for Problem Solving:

<p>Step 1: Think</p> 	<p>Individually think about the following (3-5 minutes):</p> <ul style="list-style-type: none"> • What information do you need to solve the problem? • What information do you already know? • What tools and strategies could you use? • What questions do you need to ask your group?
<p>Step 2: Pair</p> 	<p>With a partner, jot down ideas to help you get started with the problem (2-3 minutes). You may use any of the tools provided in the classroom, including calculators to help with estimating.</p>
<p>Step 3: Share</p> 	<p>Take turns sharing ideas in a larger group (3-4 minutes).</p>
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<p>Step 5:</p>	<p>The person with _____ shares your favoured strategy with the whole class.</p>

Adapted from TIPS: Section 4 – TIPS for Teachers, page 8

