



# Teaching Handbook

**Your one-stop shop for teaching  
strategies, classroom preparation, and  
self-assessment**

**Designed, composed, and written by the 2019-2020 Calculus  
Community of Practice at the University of Toronto.**



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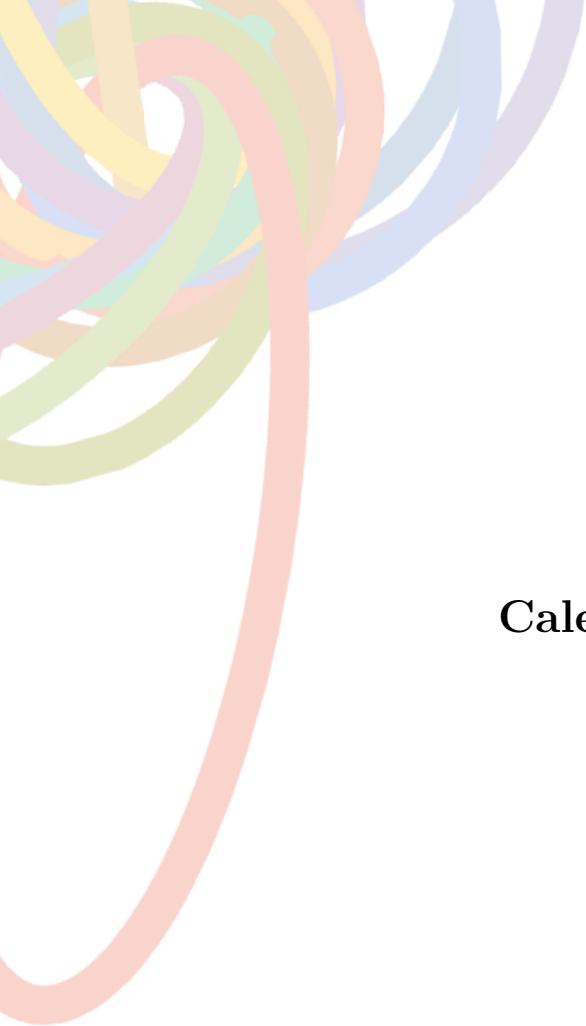




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# Calendar







| November |   |   |   |   |   |   |
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| December |   |   |   |   |   |   |
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| Key Dates |
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Year:

| January |   |   |   |   |   |   |
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| March |   |   |   |   |   |   |
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Week

Textbook Sections

Tutorial Activities

|    |       |       |       |
|----|-------|-------|-------|
| 1  | _____ | _____ | _____ |
| 2  | _____ | _____ | _____ |
| 3  | _____ | _____ | _____ |
| 4  | _____ | _____ | _____ |
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| 9  | _____ | _____ | _____ |
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| 16 | _____ | _____ | _____ |

| April |   |   |   |   |   |   |
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| May |   |   |   |   |   |   |
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| Key Dates |
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## **Lesson Plans**



**Title:** \_\_\_\_\_

**References:** \_\_\_\_\_

**Last Class:** \_\_\_\_\_

**Next Class:** \_\_\_\_\_

One Sentence Summary

Objectives

1 \_\_\_\_\_

2 \_\_\_\_\_

3 \_\_\_\_\_

4 \_\_\_\_\_

5 \_\_\_\_\_

Teacher Development

**I will focus on\expect to struggle with\am going to try**

Announcements & Reminders:

Activities

Objectives related to activity

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Time estimates



## Activities

Objectives related to activity

Time estimates

Reflection: Highlights

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Reflection: A lesson for next time

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Reflection: Targeted Question (see “Other Resources”)

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Did it live up to my expectations?

1 2 3 4 5 6 7 8 9 10

Why? \_\_\_\_\_

**Title:** \_\_\_\_\_

**References:** \_\_\_\_\_

**Last Class:** \_\_\_\_\_

**Next Class:** \_\_\_\_\_

### One Sentence Summary

### Objectives

1 \_\_\_\_\_

2 \_\_\_\_\_

3 \_\_\_\_\_

4 \_\_\_\_\_

5 \_\_\_\_\_

### Teacher Development

**I will focus on\expect to struggle with\am going to try**

Announcements & Reminders:

Activities

Objectives related to activity

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Time estimates



Reflection: Highlights

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Reflection: A lesson for next time

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4 \_\_\_\_\_

5 \_\_\_\_\_

Teacher Development

**I will focus on\expect to struggle with\am going to try**





## Activities

Objectives related to activity

Time estimates

Reflection: Highlights

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Reflection: A lesson for next time

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Reflection: Targeted Question (see “Other Resources”)

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### One Sentence Summary

### Objectives

1 \_\_\_\_\_

2 \_\_\_\_\_

3 \_\_\_\_\_

4 \_\_\_\_\_

5 \_\_\_\_\_

### Teacher Development

**I will focus on\expect to struggle with\am going to try**



Announcements & Reminders:

Blank rectangular box for announcements and reminders.

Activities

Objectives related to activity

Lined area for recording activity details.

Time estimates



Activities

Objectives related to activity

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Time estimates

Reflection: Highlights

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Reflection: A lesson for next time

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Reflection: Targeted Question (see “Other Resources”)

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### One Sentence Summary

### Objectives

1 \_\_\_\_\_

2 \_\_\_\_\_

3 \_\_\_\_\_

4 \_\_\_\_\_

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### Teacher Development

**I will focus on\expect to struggle with\am going to try**





# Activities

Objectives related to activity

Time estimates

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Reflection: A lesson for next time

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Reflection: Targeted Question (see “Other Resources”)

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Teacher Development

**I will focus on\expect to struggle with\am going to try**



Announcements & Reminders:

Activities

Objectives related to activity

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Time estimates

## Activities

Objectives related to activity

Time estimates

Reflection: Highlights

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Reflection: A lesson for next time

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Reflection: Targeted Question (see “Other Resources”)

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One Sentence Summary

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1 \_\_\_\_\_

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3 \_\_\_\_\_

4 \_\_\_\_\_

5 \_\_\_\_\_

Teacher Development

**I will focus on\expect to struggle with\am going to try**

Announcements & Reminders:

Empty rectangular box for announcements and reminders.

Activities

Objectives related to activity

Lined area for listing activities and objectives.

Time estimates





Reflection: Highlights

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Reflection: A lesson for next time

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Reflection: Targeted Question (see “Other Resources”)

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One Sentence Summary

Objectives

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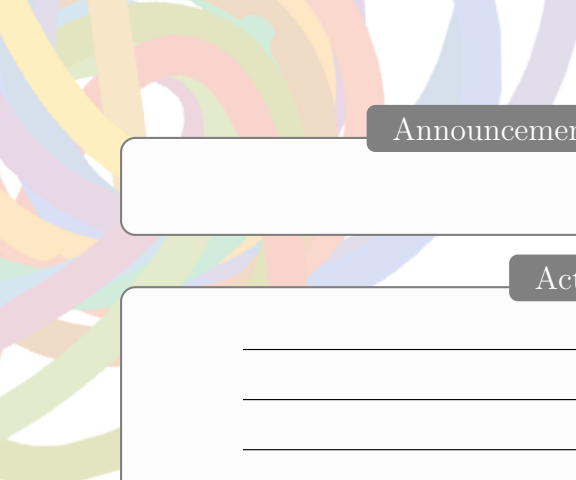
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Teacher Development

**I will focus on\expect to struggle with\am going to try**



Announcements & Reminders:

Activities

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| Objectives related to activity |       | Time estimates |
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Reflection: Highlights

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Reflection: A lesson for next time

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Reflection: Targeted Question (see “Other Resources”)

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Did it live up to my expectations?

1 2 3 4 5 6 7 8 9 10

Why? \_\_\_\_\_

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### One Sentence Summary

### Objectives

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### Teacher Development

**I will focus on\expect to struggle with\am going to try**

Announcements & Reminders:

Empty rounded rectangular box for announcements and reminders.

Activities

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| Objectives related to activity | Horizontal lines for activity notes | Time estimates |
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## Activities

Objectives related to activity

Time estimates

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Reflection: Highlights

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Reflection: A lesson for next time

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Reflection: Targeted Question (see “Other Resources”)

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One Sentence Summary

Objectives

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Teacher Development

**I will focus on\expect to struggle with\am going to try**

Announcements & Reminders:

Activities

| Objectives related to activity | Time estimates |
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## Activities

Objectives related to activity

Time estimates

Reflection: Highlights

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Reflection: A lesson for next time

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Reflection: Targeted Question (see “Other Resources”)

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Did it live up to my expectations?

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Why? \_\_\_\_\_

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One Sentence Summary

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## Activities

Objectives related to activity

Time estimates

Reflection: Highlights

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Reflection: A lesson for next time

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Reflection: Targeted Question (see “Other Resources”)

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Why? \_\_\_\_\_

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### One Sentence Summary

### Objectives

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### Teacher Development

**I will focus on\expect to struggle with\am going to try**

Announcements & Reminders:

Activities

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Objectives related to activity

Time estimates

## Activities

Objectives related to activity

Time estimates

Reflection: Highlights

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Reflection: A lesson for next time

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Reflection: Targeted Question (see “Other Resources”)

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Teacher Development

**I will focus on\expect to struggle with\am going to try**





## Activities

Objectives related to activity

Time estimates

Reflection: Highlights

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Reflection: A lesson for next time

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Reflection: Targeted Question (see “Other Resources”)

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Activities

Objectives related to activity

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Time estimates

Reflection: Highlights

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Reflection: A lesson for next time

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Teacher Development

**I will focus on\expect to struggle with\am going to try**







Activities

| Objectives related to activity | Time estimates |
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Reflection: Highlights

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Reflection: A lesson for next time

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Reflection: Targeted Question (see “Other Resources”)

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Did it live up to my expectations?

1 2 3 4 5 6 7 8 9 10

Why? \_\_\_\_\_

**Title:** \_\_\_\_\_

**References:** \_\_\_\_\_

**Last Class:** \_\_\_\_\_

**Next Class:** \_\_\_\_\_

One Sentence Summary

Objectives

1 \_\_\_\_\_

2 \_\_\_\_\_

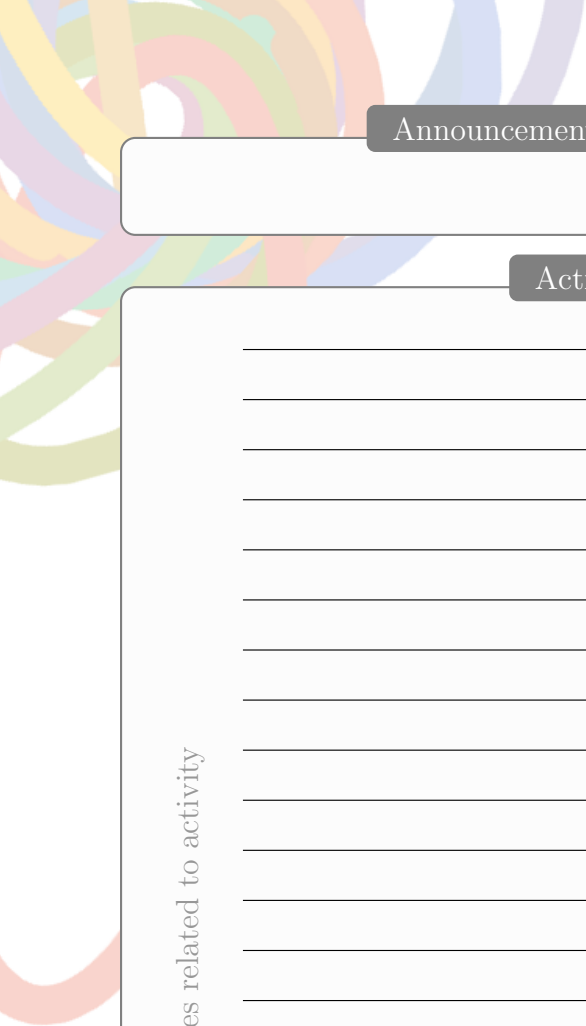
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Teacher Development

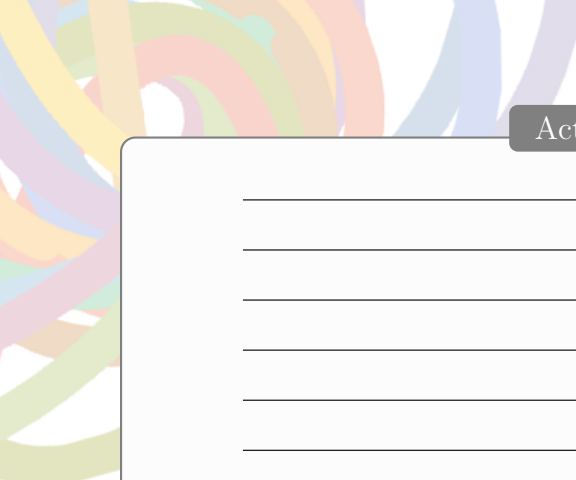
**I will focus on\expect to struggle with\am going to try**



Announcements & Reminders:

Activities

| Objectives related to activity | Time estimates |
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## Activities

Objectives related to activity

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Time estimates

Reflection: Highlights

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Reflection: A lesson for next time

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Reflection: Targeted Question (see “Other Resources”)

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Did it live up to my expectations?

1 2 3 4 5 6 7 8 9 10

Why? \_\_\_\_\_

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**References:** \_\_\_\_\_

**Last Class:** \_\_\_\_\_

**Next Class:** \_\_\_\_\_

One Sentence Summary

Objectives

1 \_\_\_\_\_

2 \_\_\_\_\_

3 \_\_\_\_\_

4 \_\_\_\_\_

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Teacher Development

**I will focus on\expect to struggle with\am going to try**

## Announcements & Reminders:

### Activities

Objectives related to activity

Time estimates



## Activities

Objectives related to activity

Time estimates

Reflection: Highlights

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Reflection: A lesson for next time

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Reflection: Targeted Question (see “Other Resources”)

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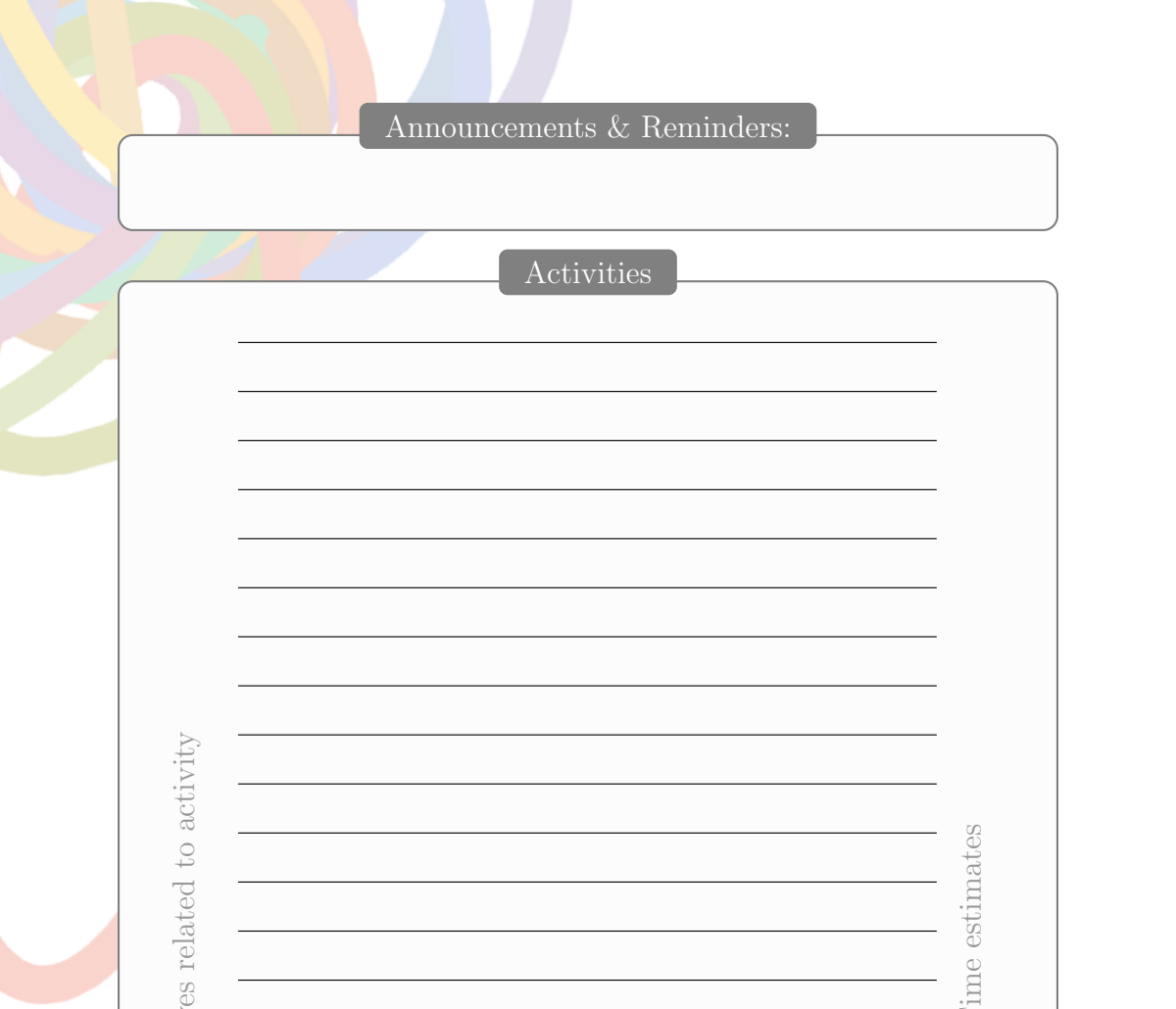
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Teacher Development

**I will focus on\expect to struggle with\am going to try**



Announcements & Reminders:

Activities

| Objectives related to activity | Time estimates |
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Reflection: Highlights

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Reflection: A lesson for next time

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Reflection: Targeted Question (see “Other Resources”)

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### One Sentence Summary

### Objectives

1 \_\_\_\_\_

2 \_\_\_\_\_

3 \_\_\_\_\_

4 \_\_\_\_\_

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### Teacher Development

**I will focus on\expect to struggle with\am going to try**



Announcements & Reminders:

Activities

Objectives related to activity

Time estimates

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## Activities

Objectives related to activity

Time estimates

Reflection: Highlights

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Reflection: A lesson for next time

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Reflection: Targeted Question (see “Other Resources”)

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Objectives

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2 \_\_\_\_\_

3 \_\_\_\_\_

4 \_\_\_\_\_

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Teacher Development

**I will focus on\expect to struggle with\am going to try**



## Activities

Objectives related to activity

Time estimates

Reflection: Highlights

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Reflection: A lesson for next time

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Reflection: Targeted Question (see “Other Resources”)

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One Sentence Summary

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1 \_\_\_\_\_

2 \_\_\_\_\_

3 \_\_\_\_\_

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Teacher Development

**I will focus on\expect to struggle with\am going to try**



Announcements & Reminders:

Empty rectangular box for announcements and reminders.

Activities

Objectives related to activity

Large lined area for writing activities, containing 20 horizontal lines.

Time estimates





Reflection: Highlights

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Reflection: A lesson for next time

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Reflection: Targeted Question (see “Other Resources”)

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1 2 3 4 5 6 7 8 9 10

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**Next Class:** \_\_\_\_\_

### One Sentence Summary

### Objectives

1 \_\_\_\_\_

2 \_\_\_\_\_

3 \_\_\_\_\_

4 \_\_\_\_\_

5 \_\_\_\_\_

### Teacher Development

**I will focus on\expect to struggle with\am going to try**

Announcements & Reminders:

Empty box for announcements and reminders.

Activities

Objectives related to activity

Lined area for writing activities.

Time estimates

## Activities

Objectives related to activity

Time estimates

Reflection: Highlights

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Reflection: A lesson for next time

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Reflection: Targeted Question (see “Other Resources”)

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One Sentence Summary

Objectives

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3 \_\_\_\_\_

4 \_\_\_\_\_

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Teacher Development

**I will focus on\expect to struggle with\am going to try**



Announcements & Reminders:

Activities

Objectives related to activity

Time estimates





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Objectives related to activity

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Time estimates

Reflection: Highlights

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Reflection: A lesson for next time

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Reflection: Targeted Question (see “Other Resources”)

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Teacher Development

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Announcements & Reminders:

Activities

Objectives related to activity

Time estimates

## Activities

Objectives related to activity

Time estimates

Reflection: Highlights

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Reflection: A lesson for next time

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Reflection: Targeted Question (see “Other Resources”)

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One Sentence Summary

Objectives

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Teacher Development

**I will focus on\expect to struggle with\am going to try**





## Activities

Objectives related to activity

Time estimates

Reflection: Highlights

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Reflection: A lesson for next time

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Reflection: Targeted Question (see “Other Resources”)

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Did it live up to my expectations?

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One Sentence Summary

Objectives

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Teacher Development

**I will focus on\expect to struggle with\am going to try**



## Activities

Objectives related to activity

Time estimates

Reflection: Highlights

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Reflection: A lesson for next time

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Reflection: Targeted Question (see “Other Resources”)

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Did it live up to my expectations?

1 2 3 4 5 6 7 8 9 10

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### One Sentence Summary

### Objectives

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### Teacher Development

**I will focus on\expect to struggle with\am going to try**

Announcements & Reminders:

Activities

Objectives related to activity

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Time estimates





Reflection: Highlights

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Reflection: A lesson for next time

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Reflection: Targeted Question (see “Other Resources”)

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Why? \_\_\_\_\_

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One Sentence Summary

Objectives

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Teacher Development

**I will focus on\expect to struggle with\am going to try**



## Activities

Objectives related to activity

Time estimates

Reflection: Highlights

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Reflection: A lesson for next time

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Reflection: Targeted Question (see “Other Resources”)

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One Sentence Summary

Objectives

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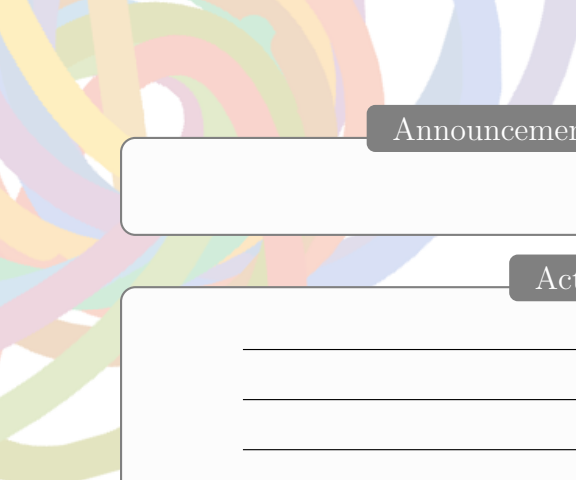
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Teacher Development

**I will focus on\expect to struggle with\am going to try**



Announcements & Reminders:

Empty rectangular box for announcements and reminders.

Activities

Objectives related to activity

Time estimates

A series of 20 horizontal lines for writing activities and their details.



## Activities

Objectives related to activity

Time estimates

Reflection: Highlights

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Reflection: A lesson for next time

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Reflection: Targeted Question (see “Other Resources”)

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One Sentence Summary

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Teacher Development

**I will focus on\expect to struggle with\am going to try**



## Activities

Objectives related to activity

Time estimates

Reflection: Highlights

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Reflection: A lesson for next time

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Reflection: Targeted Question (see “Other Resources”)

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### One Sentence Summary

### Objectives

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### Teacher Development

**I will focus on\expect to struggle with\am going to try**

Announcements & Reminders:

Activities

Objectives related to activity

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Time estimates



## Activities

Objectives related to activity

Time estimates

Reflection: Highlights

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Reflection: A lesson for next time

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One Sentence Summary

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Teacher Development

**I will focus on\expect to struggle with\am going to try**

Announcements & Reminders:

Activities

Objectives related to activity

Time estimates

## Activities

Objectives related to activity

Time estimates

Reflection: Highlights

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Reflection: A lesson for next time

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Reflection: Targeted Question (see “Other Resources”)

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One Sentence Summary

Objectives

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3 \_\_\_\_\_

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5 \_\_\_\_\_

Teacher Development

**I will focus on\expect to struggle with\am going to try**

Announcements & Reminders:

Blank space for announcements and reminders.

Activities

Objectives related to activity

Lined area for activity notes.

Time estimates



## Activities

Objectives related to activity

Time estimates

Reflection: Highlights

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Reflection: A lesson for next time

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Reflection: Targeted Question (see “Other Resources”)

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## Activities

Objectives related to activity

Time estimates

Reflection: Highlights

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Reflection: A lesson for next time

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### One Sentence Summary

### Objectives

1 \_\_\_\_\_

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4 \_\_\_\_\_

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### Teacher Development

**I will focus on\expect to struggle with\am going to try**

Announcements & Reminders:

Activities

Objectives related to activity

Horizontal lines for activity notes

Time estimates



## Activities

Objectives related to activity

Time estimates

Reflection: Highlights

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Reflection: A lesson for next time

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Reflection: Targeted Question (see “Other Resources”)

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Did it live up to my expectations?

1 2 3 4 5 6 7 8 9 10

Why? \_\_\_\_\_

**Title:** \_\_\_\_\_

**References:** \_\_\_\_\_

**Last Class:** \_\_\_\_\_

**Next Class:** \_\_\_\_\_

One Sentence Summary

Objectives

1 \_\_\_\_\_

2 \_\_\_\_\_

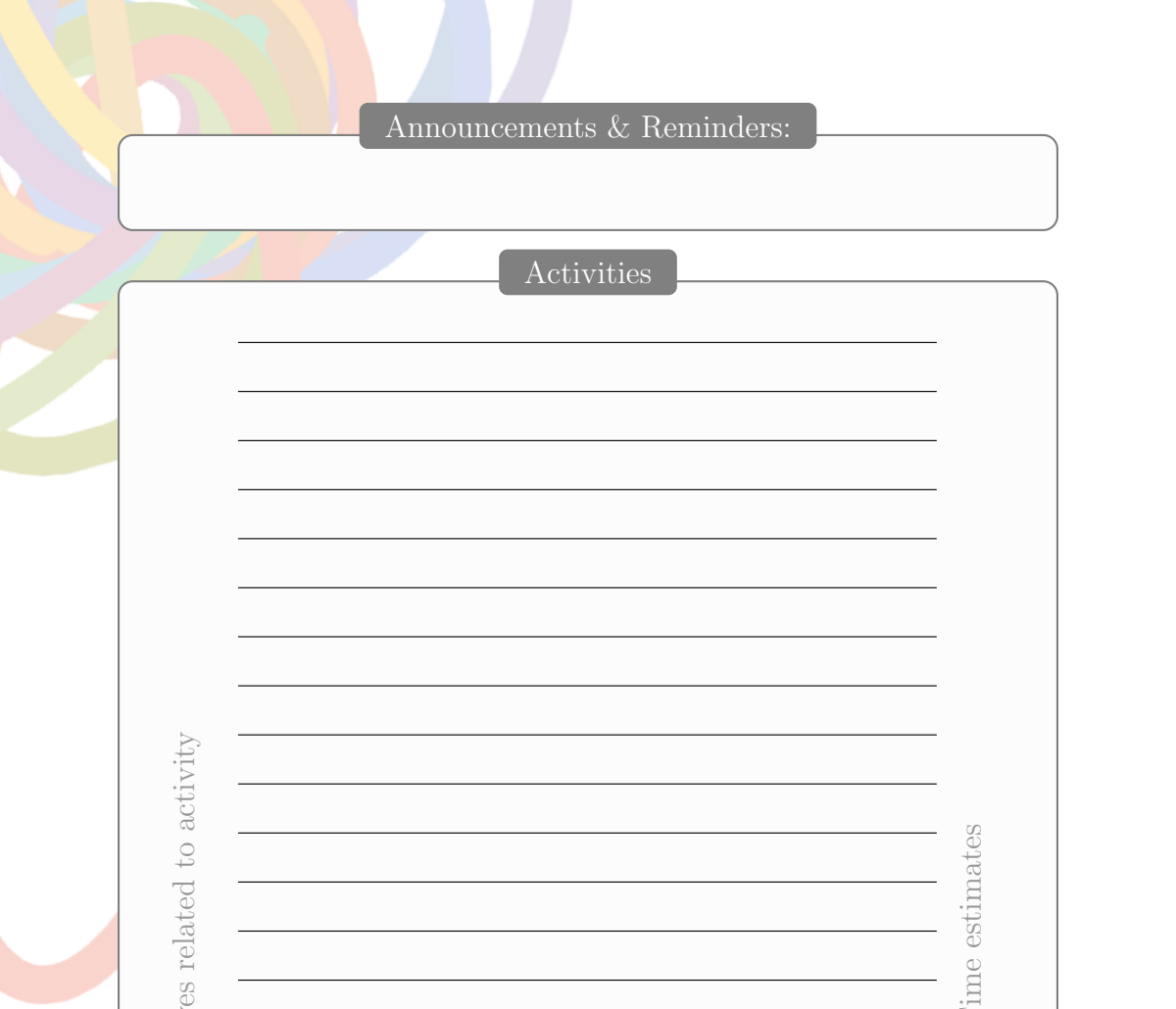
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Teacher Development

**I will focus on\expect to struggle with\am going to try**



Announcements & Reminders:

Empty rectangular box for announcements and reminders.

Activities

Objectives related to activity

Time estimates

Large rectangular box containing horizontal lines for writing activities, objectives, and time estimates.

Activities

Objectives related to activity

Time estimates

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Reflection: Highlights

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Reflection: A lesson for next time

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Reflection: Targeted Question (see “Other Resources”)

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One Sentence Summary

Objectives

1 \_\_\_\_\_

2 \_\_\_\_\_

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4 \_\_\_\_\_

5 \_\_\_\_\_

Teacher Development

**I will focus on\expect to struggle with\am going to try**

Announcements & Reminders:

Activities

Objectives related to activity

Time estimates



## Activities

Objectives related to activity

Time estimates

Reflection: Highlights

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Reflection: A lesson for next time

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Reflection: Targeted Question (see “Other Resources”)

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One Sentence Summary

Objectives

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Teacher Development

**I will focus on\expect to struggle with\am going to try**

Announcements & Reminders:

Activities

Objectives related to activity

Lined area for activity notes and objectives

Time estimates



Reflection: Highlights

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Reflection: A lesson for next time

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Teacher Development

**I will focus on\expect to struggle with\am going to try**



Announcements & Reminders:

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Objectives related to activity

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Time estimates



## Activities

Objectives related to activity

Time estimates

Reflection: Highlights

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Reflection: A lesson for next time

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Reflection: Targeted Question (see “Other Resources”)

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Teacher Development

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Announcements & Reminders:

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Objectives related to activity

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Time estimates

## Activities

Objectives related to activity

Time estimates

Reflection: Highlights

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Reflection: A lesson for next time

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Reflection: Targeted Question (see “Other Resources”)

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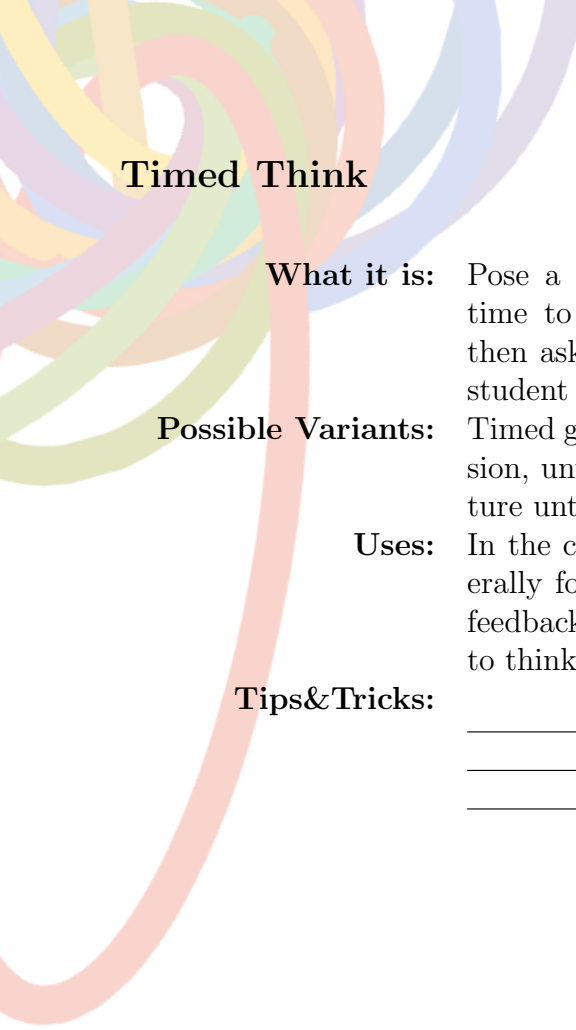








## Teaching Toolbox



## Timed Think

**What it is:** Pose a question, give the students a set time to think about the answer silently, then ask the question again and call on a student to answer it.

**Possible Variants:** Timed group discussion, timed pair discussion, untimed lecture pause (ie, pause lecture until enough hands are raised).

**Uses:** In the case of a silent class, this will generally force an answer from the room. In feedback, students often want more time to think about a problem after it is asked.

**Tips&Tricks:**

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Experiences



## Think-Pair-Share (TPS)

**What it is:** With a question posed, students think silently about an answer. Then they pair up, and share their response with their neighbour.

**Possible Variants:** Explain instead of share, Think-Group-Share, Think-Pair-Share with a classroom voting system (Think-Vote-Share-Vote), repeated Think-Pair-Share-Think-Pair-Share, Think-Pair-Share where during the "Pair" step the student must find a classmate who has a different answer to them.

**Uses:** This is the crux of active learning, and should be used for simple, conceptual questions, not long computational question.

**Tips&Tricks:**

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Experiences



## Punctuated Lecture

**What it is:** A fast-paced lecture, where at the end of every slide there is a comprehension-style question, such as “why does this computation work?”, “explain this step”. The question is then worked through using **TPS**.

**Possible Variants:** Questions can be posed in an interactive voting system, see also: **Going Through the Steps**

**Uses:** This is a good technique for getting through material that is emphasized in class, as opposed to reviewing pre-class material. It combos well with timed thinks and TPS.

**Tips&Tricks:**

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Experiences



## Free-For-All Online Discussion

**What it is:** A class-wide open discussion, where any student can contribute text or pictures to a forum-style tool. This can be done using TopHat, Google Docs, or Quercus.

**Possible Variants:** Timed responses, group submission, see also: **Write & Quiz**, **Write the Test**, and **1-Minute Essay**.

**Uses:** This can be used for getting a lot of ideas fast, and to consolidate student solutions for everyone to see and use later in studying.

**Tips&Tricks:**

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Experiences

## 1-Minute Essay

**What it is:** Students write a 1-minute essay linking concepts, explaining a concept, or summarizing a concept learned in class. This can be done with or without a specific prompt.

**Possible Variants:** 5-minute essay, 1-minute paragraph, writing in groups, 1-minute list, end-of-class summary. See also: **ice cream sandwich**, **write & quiz**, and **free-for-all discussion**.

**Uses:** This activity is a good conclusion to a lecture, module, or other topic. Walking around to pick students to read their sentences out loud to their neighbours can also be used to build comfort within a group.

**Tips&Tricks:**

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Experiences



## Fill-In Blanks

**What it is:** A short, fill-in-the-blanks pop-quiz, either on the board, on a slide, or through an interactive classroom response system.

**Possible Variants:** Giving the word possibilities, see also: **1-minute essay**

**Uses:** This is a good activity to start a class or a topic, and to make sure that everyone has done the reading, is on the same page, and is ready to start learning.

**Tips&Tricks:**

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Experiences



## Write & Quiz

**What it is:** Students come up with a question, then partner up and quiz each other.

**Possible Variants:** Larger groups sharing the questions, forcing questions to be conceptual or computational. See also: **free-for-all discussion**, **write the test**, **paper passaround**.

**Uses:** This is a good activity when there is a lot of relatively straightforward material that would take a long time to go over, but should be spot-checked. This activity also gets students to think about what questions could appear on tests.

**Tips&Tricks:**

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Experiences





## Concept Map

**What it is:** A concept map is a directed or undirected graph with concepts for nodes and edges for connections between them. Edges should be labeled. The activity is to make a concept map.

**Possible Variants:** Students can get: list of concepts, the concept map without edges, or the concept map with unlabelled edges.

**Uses:** This is an excellent review-session tool, as it takes up the entire class, and can cover a lot of material. The main goal of the activity is to introduce students to the idea, not to finish the map.

**Tips&Tricks:**

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Experiences



## Critique History & News

**What it is:** A short lesson on the origins of the course content, or a news clipping related to it. The more primary sources, the better.

**Possible Variants:** Having students see the primary source and critique it.

**Uses:** Some students love this, some hate it, but it can be used to show to students that math was always difficult, and that other people also make mistakes.

**Tips&Tricks:**

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Experiences



## Going Through the Steps

**What it is:** Write a sequence of steps to solve a problem, and go through them one by one using other teaching-toolbox tools.

**Possible Variants:** Handout with steps, allow students to find the correct order of the steps. See also: **punctuated lecture, think-pair-share.**

**Uses:** This is a good activity to use to teach students a specific problem-solving strategy.

**Tips&Tricks:**

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Experiences



## The Tommy Question

**What it is:** Tommy writes an incorrect or incomplete solution to a problem, and the students need to fix the solution.

**Possible Variants:** Use previous exam solutions, have students grade the response, let students address their explanation to Tommy

**Uses:** This is a good activity to target subtle misconceptions and to highlight common pitfalls students may encounter

**Tips&Tricks:**

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Experiences



## Round Robin

**What it is:** Students get into groups and take turns highlighting key points from the lecture or course content. Possible variant: **Playing Darts** - Students shout concepts related to the material, and the instructor writes them down on the board. Finish with a follow-up at the end of class outlining what was and wasn't covered in class.

Pairs well with a **timed think**

**Possible Variants:** This activity can be an opener and a closer, and reminds students that they are also responsible for things not covered in class.

**Uses:**

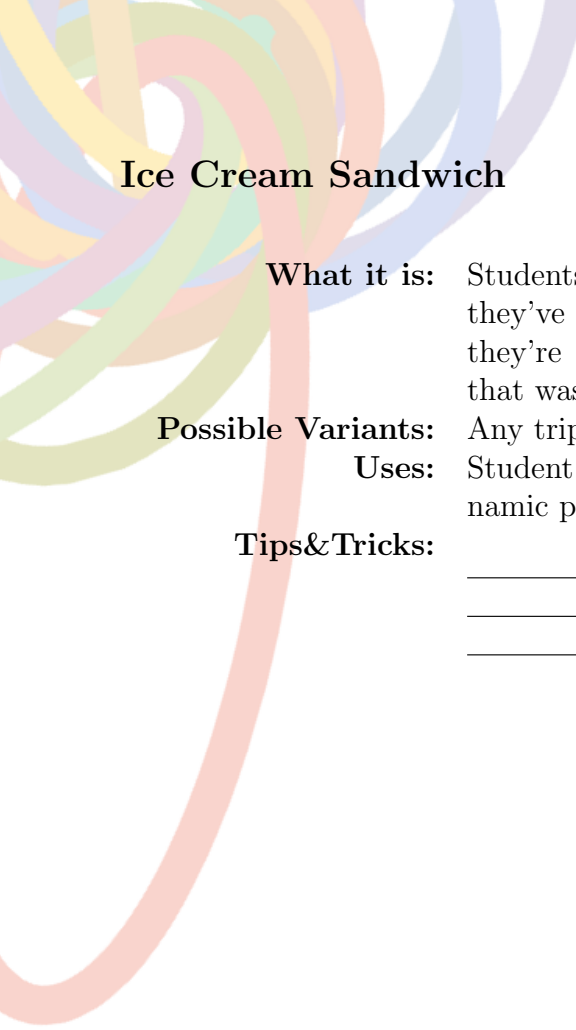
**Tips&Tricks:**

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Experiences



## Ice Cream Sandwich

**What it is:** Students write three things: something they've mastered in the unit, something they're struggling with, and something that was cleared up

**Possible Variants:** Any triple of questions can work!

**Uses:** Student reflection, seeing learning as a dynamic process.

**Tips&Tricks:**

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Experiences



## Draw the Definition/Theorem

**What it is:** Provide the students with a definition or theorem and have them illustrate this definition or theorem. Their drawing could be of an explicit example which works, or something more general.

**Possible Variants:** Provide the students with a definition or theorem and a sketch. Have students fill in anything which is missing, and have them colour-code parts of the definition or theorem and colour the corresponding part of the picture that colour as well.

**Uses:** Allows students to engage with a definition or theorem and build some intuition about the concept.

**Tips&Tricks:**

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Experiences



## Geogebra Applets

**What it is:** Geogebra has many free applets available on its platform. It is possible to find many applets which are interactive and allow students to interact with different concepts. Be sure to test out the applet before use to ensure it is what you're looking for!

**Possible Variants:** There are a variety of different applets available. Some of the applets can be an entire activity on their own, and others can be a supplement to help you illustrate an idea to students.

**Uses:** Allows students to build intuition behind different concepts in a visual, yet interactive way.

**Tips&Tricks:**

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Experiences





## Jigsaw

**What it is:** Break the class into groups and have each group solve a different part of a problem. At the end, every one comes together to synthesize their solutions to solve the main problem.

**Possible Variants:** This can be used to fill in tables, to see patterns emerging through examples, or to solve a larger problem as a group.

**Uses:** This can be used to explore theorems or definitions and build intuition.

**Tips&Tricks:**  
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### Experiences



## Gameshow

**What it is:** For review, have large a variety of questions prepared which you will display one at a time. Students will answer questions, and will keep track of their longest streak of correct answers.

**Possible Variants:** Could have the class break up into teams to play, or change the format to mimic a real game show (for example, Jeopardy).

**Uses:** A fun way to engage students during a review class before a midterm or final exam.

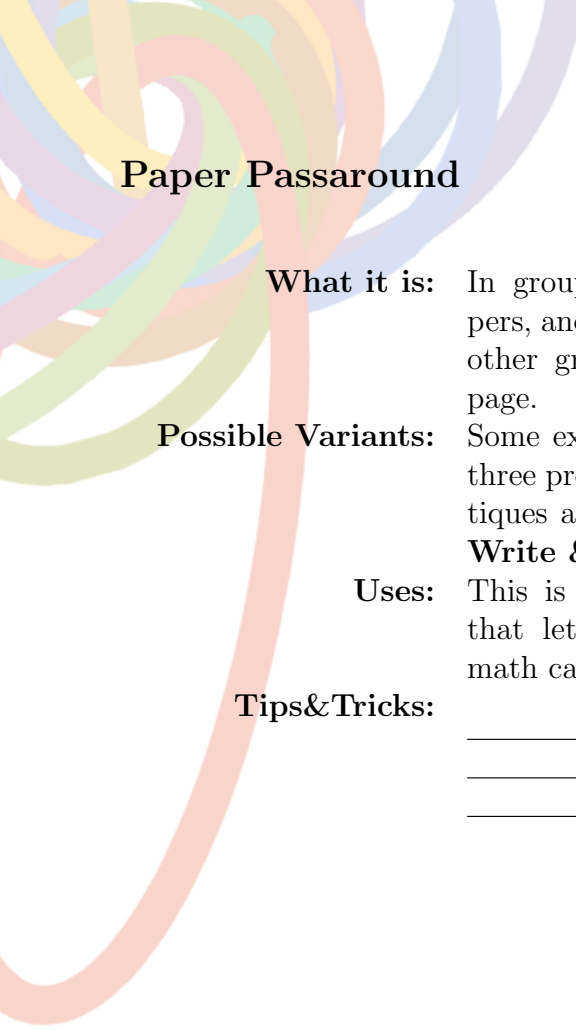
**Tips&Tricks:**

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Experiences



## Paper Passaround

**What it is:** In groups, students write things on papers, and exchange with other groups. The other group reads, and responds on the page.

**Possible Variants:** Some examples: each group solves one of three problems on the board, and then critiques another group's solution. See also: **Write & Quiz**

**Uses:** This is a good physical writing exercise that lets students see and critique how math can be communicated in writing.

**Tips&Tricks:**

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Experiences



## Run the Test

**What it is:** Students play the role of the instructor in writing, grading, or helping students during a test-environment. For example, students may be given a solved test to critique, or could be asked to give advice to students before, after, or during the test (see: **Tommy question**)

**Possible Variants:** An online tool to collect student-made test questions to create a question bank can be useful.

**Uses:** This exercise can be used to demystify the test, and to highlight common mistakes. See also: **Write & Quiz, Free-For-All Online Discussion**

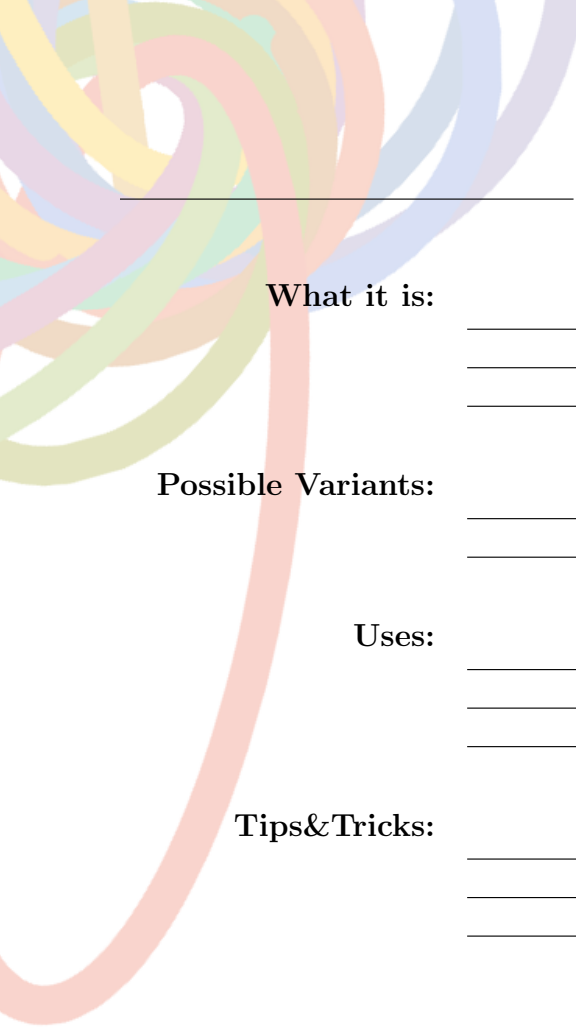
**Tips&Tricks:**

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Experiences



**What it is:**

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**Possible Variants:**

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**Uses:**

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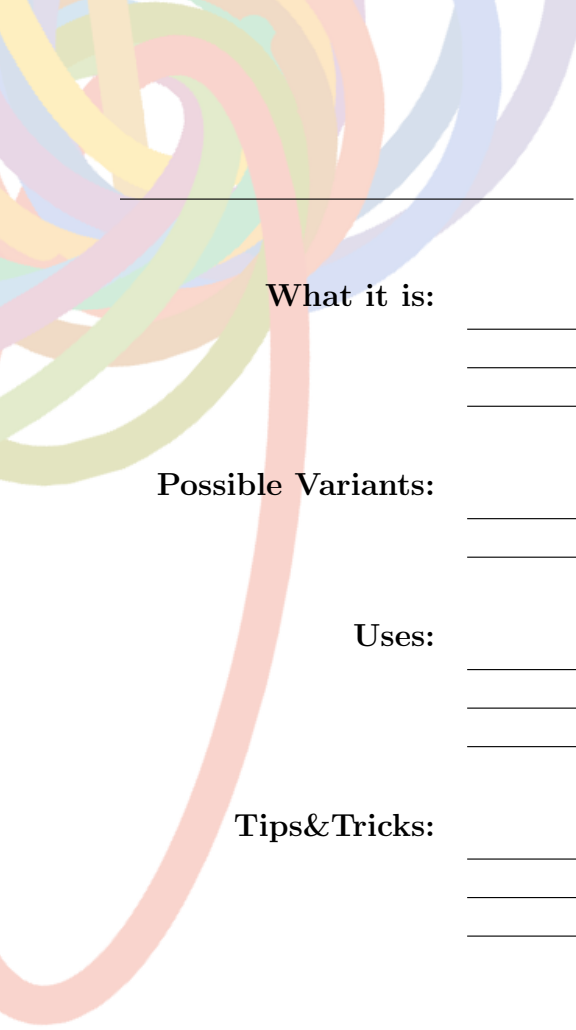
**Tips&Tricks:**

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Experiences



**What it is:**

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**Possible Variants:**

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**Uses:**

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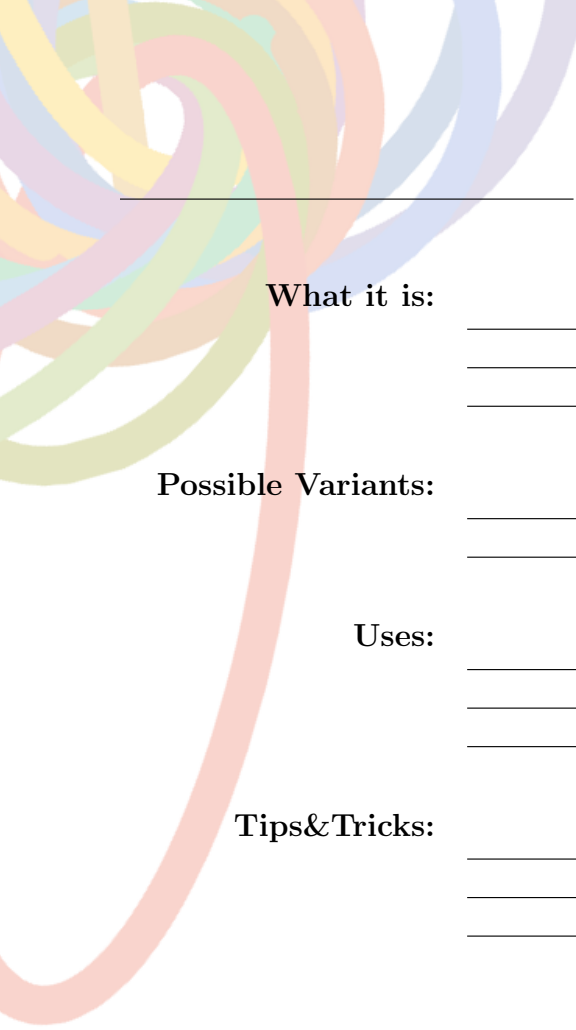
**Tips&Tricks:**

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Experiences



**What it is:**

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**Possible Variants:**

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**Uses:**

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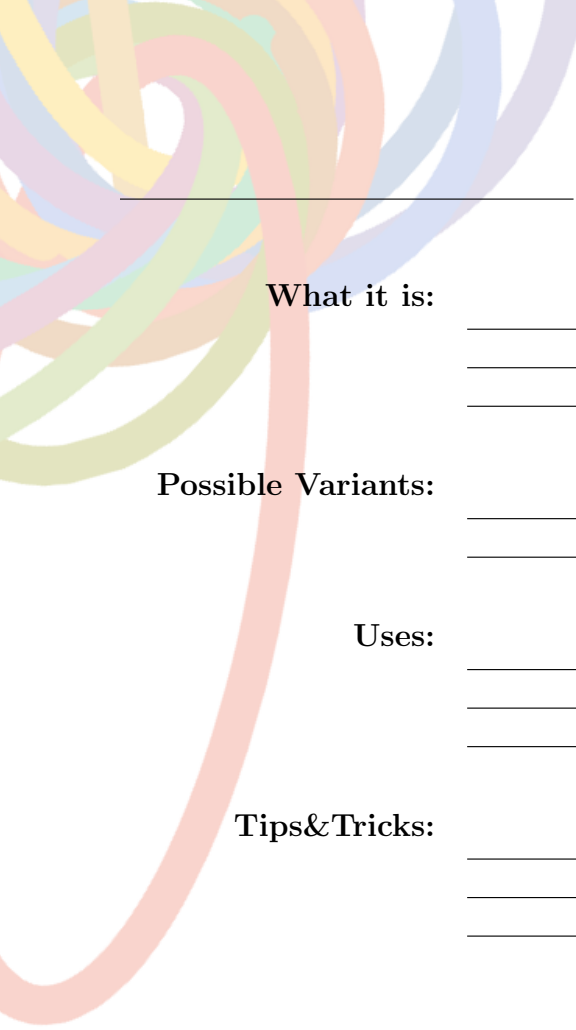
**Tips&Tricks:**

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Experiences



**What it is:**

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**Possible Variants:**

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**Uses:**

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**Tips&Tricks:**

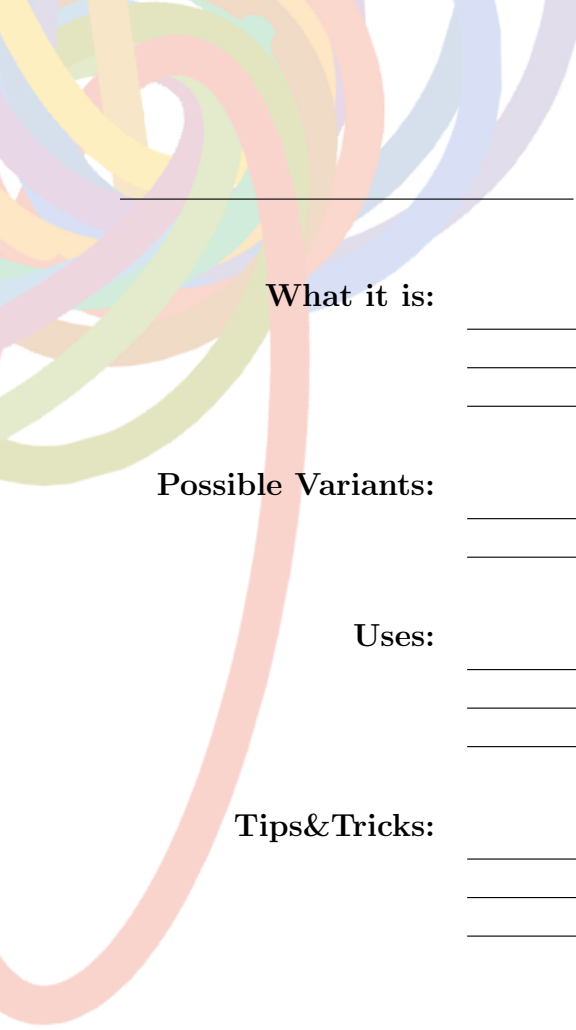
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Experiences





**What it is:**

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**Possible Variants:**

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**Uses:**

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**Tips&Tricks:**

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Experiences





## **Other Resources**

## Targeted Reflection Questions

1. What is something that surprised me?
2. Did any student make the class special?
3. What teaching strategy went well?
4. Did something funny happen?
5. When was the class was engaged/disengaged?
6. How did the space affect the class?
7. What did I do that was helpful?
8. Did something accidental happen?
9. When did the class feel rushed/slogged?
10. Expand an activity from the class
11. How did my body language affect the class?
12. What mistakes did I make?
13. What was a good question that was asked?
14. How did my introduction affect the lesson?
15. How did my conclusion tie the class together?
16. A haiku about my class.
17. What are my students struggling with?

## Critical Incident Questionnaire

One can put this on a google docs survey for the students to complete, TopHat, or paper. The idea is to give the survey periodically throughout the semester and provide the students feedback on the lecture immediately following the survey.

A good idea is to use a URL shortener and give the students a short URL.

### Critical Incident Questionnaire

- At what moment in class this week did you feel most engaged with what was happening?
- At what moment in class this week were you most distanced from what was happening?
- What action that anyone (teacher or student) took this week did you find most affirming or helpful
- What action that anyone took this week did you find most puzzling or confusing?
- What about the class this week surprised you the most?

How will you (the instructor) make changes to accommodate the student feedback? The best practice is to provide students with the summary of their responses (i.e. top replies) and indicate what changes you are implementing to address these.

## Phonebook

1. Campus Police: 416-978-2222
2. Building Related Issues: 416-978-3000
3. Student Crisis Response: 416-946-7111
4. Accessibility Services: 416-978-8060
5. \_\_\_\_\_
6. \_\_\_\_\_

## Other Resources

1. The Active Calculus Textbook: [activecalculus.org](http://activecalculus.org)
2. TopHat Field Manual: TODO
3. *Peer Instruction: A User's Manual*, by Eric Mazur
4. *Make It Stick: The Science of Successful Learning*, by Peter C. Brown
5. American Mathematical Society blog on math education: [blogs.ams.org/matheducation/](http://blogs.ams.org/matheducation/)
6. Teaching in higher education podcast: [teachingin-highered.com](http://teachingin-highered.com)
7. Professor Mayes-Tang's Medium page (articles): [medium.com/@SMayesTang](https://medium.com/@SMayesTang)

1. CBMS: Active Learning in Post-Secondary Mathematics Education Statement
2. *What does active learning mean for mathematicians?*, AMS Notices, B. Braun et al.
3. *Active learning increases student performance in science, engineering, and mathematics*, by S. Freeman et al.
4. *Persistent Learning, Critical Teaching: Intelligence beliefs and active learning in mathematics courses*, AMS Notices, B. Braun
5. *From Lecture to Active Learning: Rewards for all, and is it really so different?*, David Pengally
6. *What have we learned from calculus reform? The Road to conceptual understanding*, D. H. Hallett
7. *Problem Solving: Moving from Routine to Non-routine and Beyond*, AMS Notices, B. Garelick
8. *Measuring actual learning versus feeling of learning in response to being actively engaged in the classroom*, L. Deslauriers et al, PNAS, 2019.

Many thanks to Professor Mayes-Tang for her help in compiling this list.

## Teaching Quotes

“I am not a teacher, but an awakener”

– Robert Frost



“I never teach my pupils. I only attempt to provide the conditions in which they can learn.”

– Albert Einstein



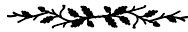
“What we learn with pleasure we never forget.”

– Alfred Mercier



“To teach is to learn twice over.”

– Joseph Joubert



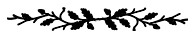
“I am interested in helping students feel successful; to attempt to remove the comfort zone of the passive learner and to empower students to actively engage in their own learning as well as that of their peers.”

– Simon Albon

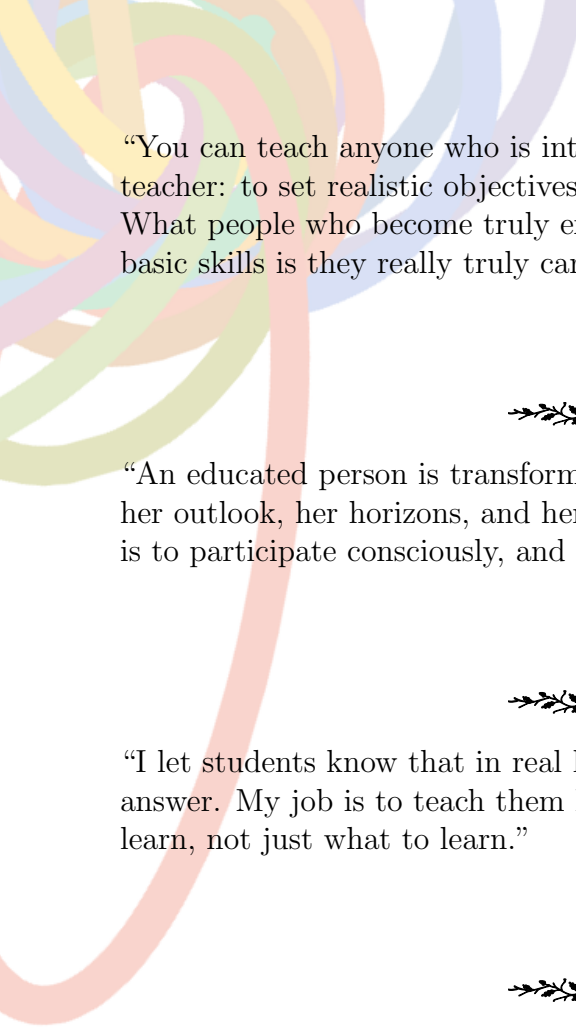


“I believe passionately in David Suzuki’s notion of ‘the power of one,’ that I can make a difference in my work with prospective teachers and create a ‘ripple effect’ in education. This means I have a responsibility to be a role model as a scholar, a teacher, and mentor to help my students implement informed and thoughtful teaching practices, build communities of inquirers in their classrooms and schools, and become lifetime learners through ongoing professional development and study.”

– Marilyn Chapman







“You can teach anyone who is interested in teaching to be a good teacher: to set realistic objectives, to be well organized, to be clear... What people who become truly exceptional teachers add to these basic skills is they really truly care that their students learn.”

– Carol-Ann Courneya



“An educated person is transformed by what she knows; it changes her outlook, her horizons, and her habits of mind. To teach someone is to participate consciously, and carefully, in that transformation.”

– Linda Farr Darling



“I let students know that in real life, there’s more than one right answer. My job is to teach them how to approach a problem – how to learn, not just what to learn.”

– Mary Ensom



“I emphasize clarity and planning. Equally important are a sense of humour and a courteous attitude.”

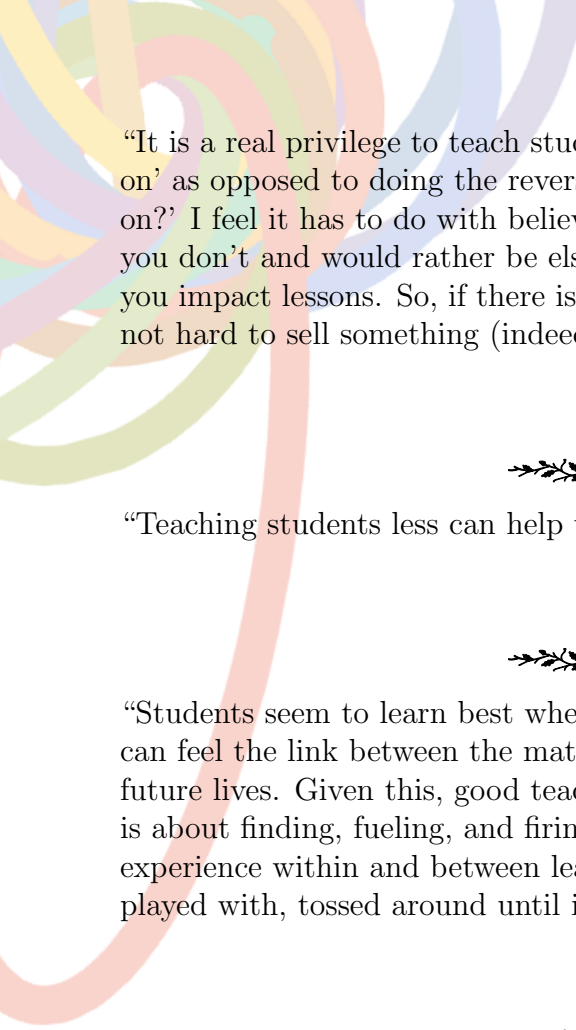
– Keith Farquhar



“The thing I enjoy most is teaching first-year courses. A first-year course is not just an introduction to some subject – it is also an opportunity for the instructor to introduce students to his or her passion for that subject.”

– Christopher Friedrichs





“It is a real privilege to teach students – an opportunity to ‘turn them on’ as opposed to doing the reverse. And the key to ‘turning them on?’ I feel it has to do with believing in what you are selling. For if you don’t and would rather be elsewhere, students pick that up and you impact lessons. So, if there is one quote from me, it would be: It’s not hard to sell something (indeed someone) you believe in.”

– Dan Gardiner



“Teaching students less can help them remember more.”

– Lee Gass



“Students seem to learn best when their curiosity is engaged and they can feel the link between the material and their own past, present or future lives. Given this, good teaching is about fostering curiosity. It is about finding, fueling, and firing up the links and creating experience within and between learners. Course content exists to be played with, tossed around until it becomes pertinent.”

– Clarissa Green



“My basic teaching philosophy is to be enthusiastic about my subject, honest about potential confusions, and unambiguous in my explanations”

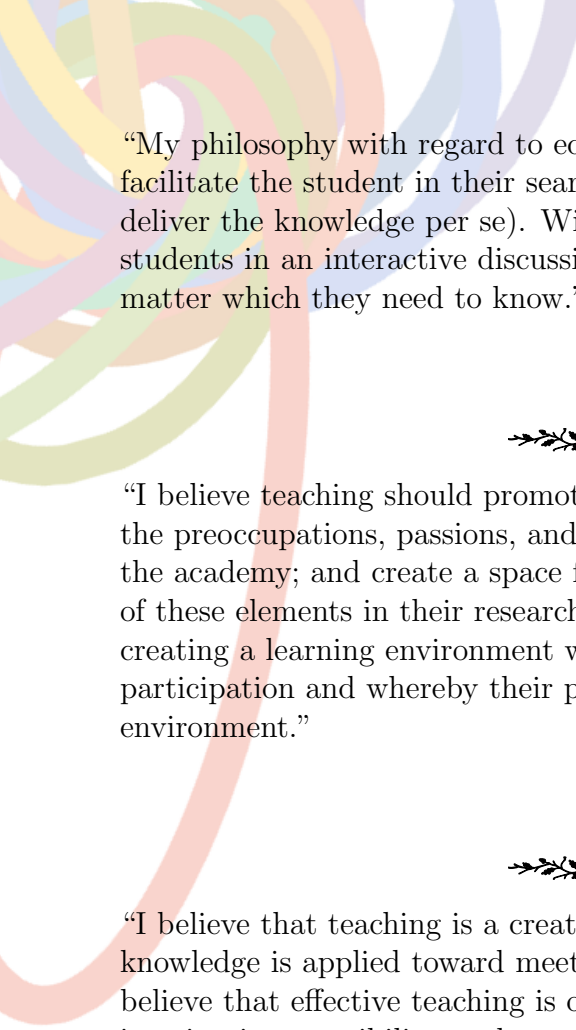
– Chris Orvig



“My philosophy of teaching is to provide an atmosphere of caring and respect for students in order to promote free-thinking and independent learning.”

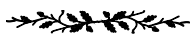
– Wayne Riggs





“My philosophy with regard to education is that the teacher should facilitate the student in their search for knowledge (rather than deliver the knowledge per se). With this in mind I try to engage the students in an interactive discussion around the specific subject matter which they need to know.”

– Niamh Kelly



“I believe teaching should promote the autonomy of students; elicit the preoccupations, passions, and lived experience students bring to the academy; and create a space for articulation and scholarly inquiry of these elements in their research and in their writing. My priority is creating a learning environment with structures that engage student participation and whereby their participation shapes the learning environment.”

– Karen Meyer



“I believe that teaching is a creative art in which evidence-based knowledge is applied toward meeting the learning goals of learners. I believe that effective teaching is often the spark that ignites the imagination, possibility, and promise for learners, including the teacher.”

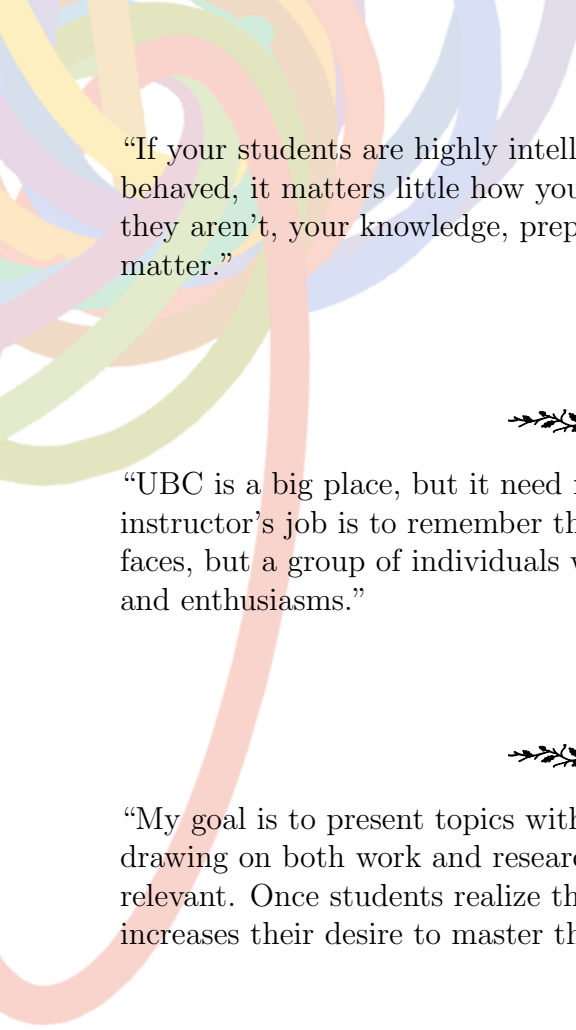
– Barbara Paterson



“Listen, respect, and respond to students’ points of view; be excited about mutual engagement in construction of knowledge; love learning and its complexity. Be curious about and committed to the possibilities inherent in the intersection of scholarship, mentorship, and pedagogy.”

– Marion Porath





“If your students are highly intelligent, strongly motivated and well behaved, it matters little how you teach as they will thrive anyway. If they aren’t, your knowledge, preparation and skill as a teacher do matter.”

– William Webber



“UBC is a big place, but it need not be an impersonal one. The instructor’s job is to remember that a big class is not just a sea of faces, but a group of individuals with different backgrounds, interests and enthusiasms.”

– Christopher Friedrichs



“My goal is to present topics with excitement and enthusiasm, drawing on both work and research experiences to make material relevant. Once students realize the value of their marketable skills it increases their desire to master those skills and concepts.”

– Wayne Riggs



“I teach that a discovery is not simply a eureka moment, but instead a process where you capture a glimpse of nature exposed, convince your peers of what you saw and demonstrate utility. Eureka on its own is merely an observation.”

– Stephen W. Scherer





