

# Teacher Worksheets

## Determining the Peak of a Meteor Shower Using Histograms

**Grade:** 9

**Curriculum Outcome:** 312-05 Students will be expected to describe the composition and characteristics of asteroids/meteors.

209-4 (organize data)

210-16 (analyse and identify questions from the data)

(Also Grade 11 math: histograms)

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# Activity 1

Refer to the image files provided by your teacher. Each image has the date it was taken stamped on it. Keep in mind that these images are only a sample, meant to represent the distribution of meteors during the actual event. From these images, you will develop a histogram, plotting the frequency of meteor sightings on the y-axis and your time bins on the x-axis. Use a bin size of one day.

In the space below, create a tally of the number of meteors falling within each bin.

How many bins do you have? \_\_\_\_\_

In which bin did we have the fewest meteor sightings? The most? \_\_\_\_\_

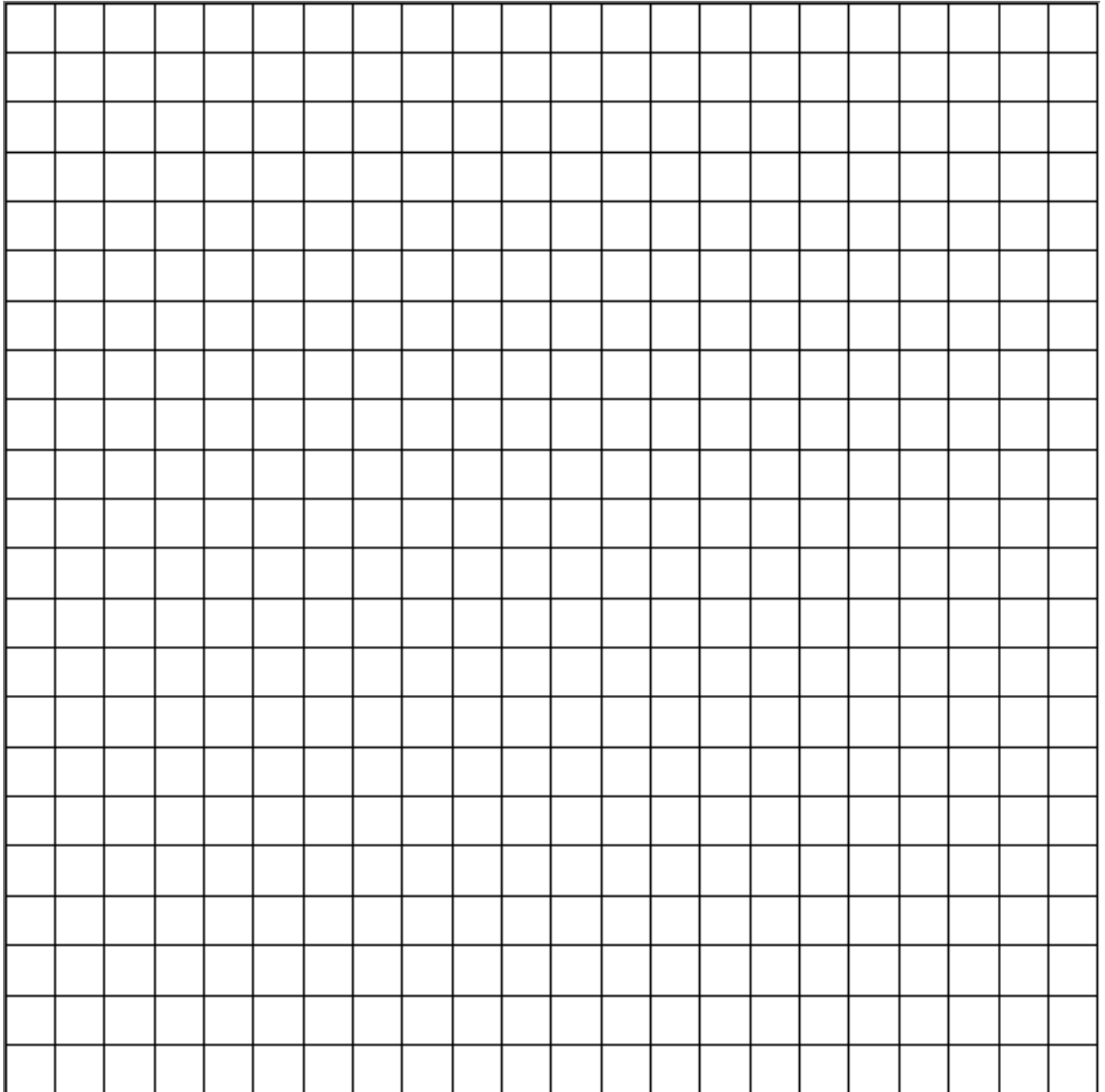
On the attached sheet of graph paper, plot your histogram. Remember that the number of meteors observed should be plotted on the y-axis and the bins should be plotted on the x-axis.

On which day did the peak occur? How can you tell? \_\_\_\_\_

Referring to the Meteor Shower Calendar (2007), which meteor shower are these images from?

What is the source of the meteor shower? \_\_\_\_\_

# Histogram: Activity 1



## Activity 2

Refer to the image files provided by your teacher. Each image has the date it was taken stamped on it. Keep in mind that these images are only a sample, meant to represent the distribution of meteors during the actual event. From these images, you will develop a histogram, plotting the frequency of meteor sightings on the y-axis and your bins on the x-axis. Use a bin size of one day.

In the space below, create a tally of the number of meteors falling within each bin.

How many bins do you have? \_\_\_\_\_

In which bin did were there the fewest meteor sightings? The most? \_\_\_\_\_

\_\_\_\_\_

On the attached sheet of graph paper, plot your histogram. Remember that the number of meteors observed should be plotted on the y-axis and the time bins should be plotted on the x-axis.

On which day did the peak occur? How can you tell? \_\_\_\_\_

\_\_\_\_\_

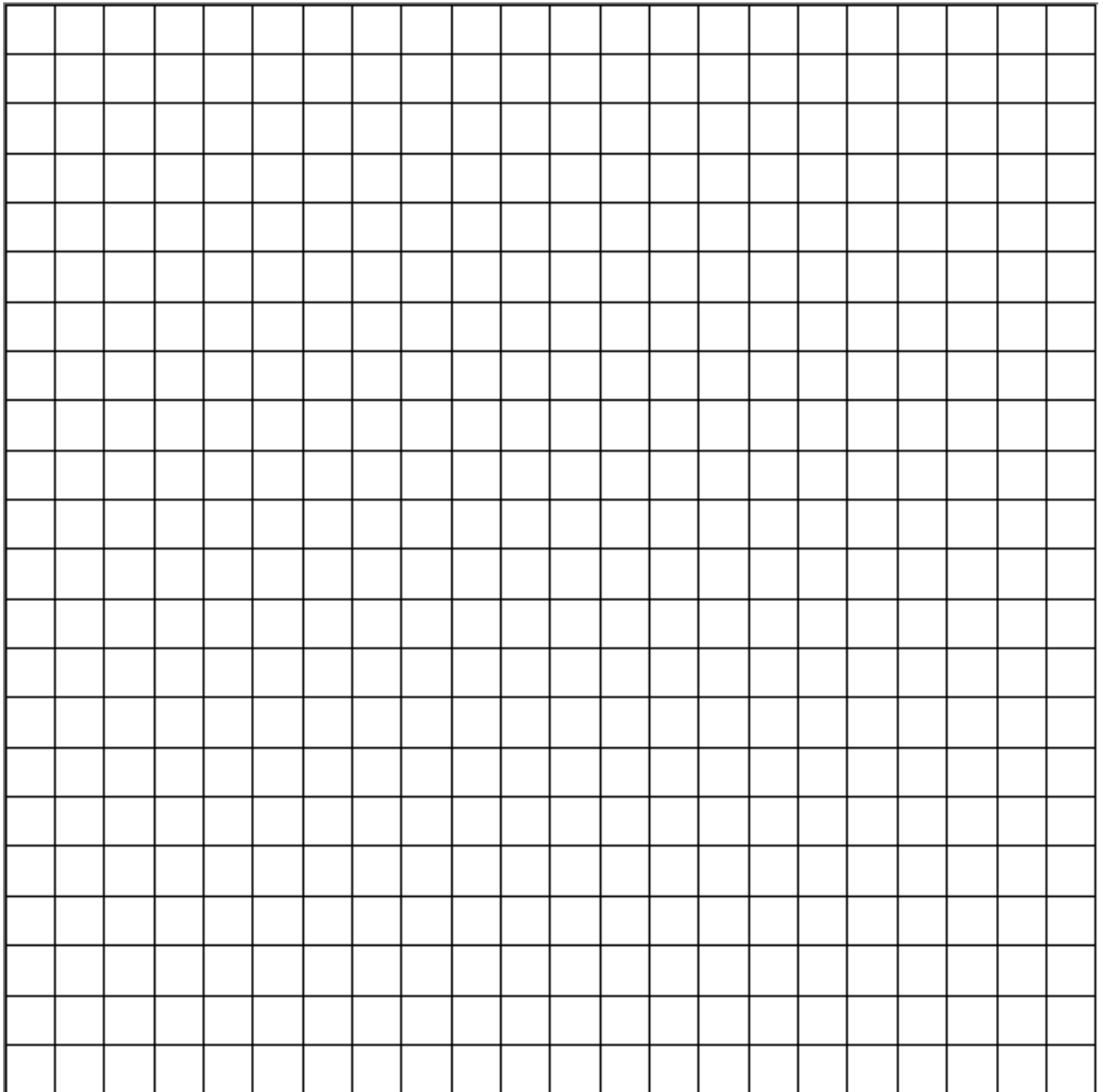
\_\_\_\_\_

Referring to the Meteor Shower Calendar (2007), which meteor shower are these images from?

\_\_\_\_\_

What is the source of the meteor shower? \_\_\_\_\_

# Histogram: Activity 2



# Determining the Peak of a Meteor Shower Using Histograms

## Teacher's Guide

**Grade:** 9

**Curriculum Outcomes:** 312-05 Students will be expected to describe the composition and characteristics of asteroids/meteors.

209-4 (organize data)

210-16 (analyse and identify questions from the data)

### Materials:

1. Ruler and pencil
2. Worksheets for activity one and two
3. Access to images (hardcopy on paper, or via computer). **IMAGE FILES Activity 1 (Powerpoint file)**  
**IMAGE FILES Activity 2 (Powerpoint file)**

### Definitions

1. Meteor - Small rocks or sand making a bright trail through the sky as it burns in the atmosphere. Often called a falling or shooting star.
2. Meteor Shower – a celestial event in which a number of meteors seem to radiate from one point in the sky.
3. Peak – the time of a meteor shower when the highest frequency of meteors are observed.
4. Histogram – a graphical display of tabulated frequencies, shown as bars

### Links to videos

Video of the Geminids from an all sky camera: <http://www.youtube.com/watch?v=c383VYFZ8Co>

Video of a bright Geminid fireball: [http://www.youtube.com/watch?v=k\\_tuk76Dg0U&NR=1](http://www.youtube.com/watch?v=k_tuk76Dg0U&NR=1)

Video of a fireball in Alberta: [http://www.youtube.com/watch?v=e\\_2aX-784sw&feature=related](http://www.youtube.com/watch?v=e_2aX-784sw&feature=related)

**Description:** When students are learning about meteors and meteor showers, you may want to show videos to help them get an idea of what a meteor or a meteor shower looks like. Three example videos are shown above. This activity is designed to help students identify the peak of a meteor shower, and identify which meteor shower it belongs to. It also serves as an introduction to the concept of histograms, which they learn in grade 11 math. This lesson could be extended carefully to match that particular grade 11 unit.

In each activity, students will be asked to plot a histogram that records the number of meteors sighted by the camera each day. Then, the students will be asked to determine the peak of the meteor shower from their data, and identify the meteor shower being viewed using the Meteor Shower Calendar from 2007.

This activity could be extended by having the students plot the histograms using technology.

# Answer Key

## Activity 1

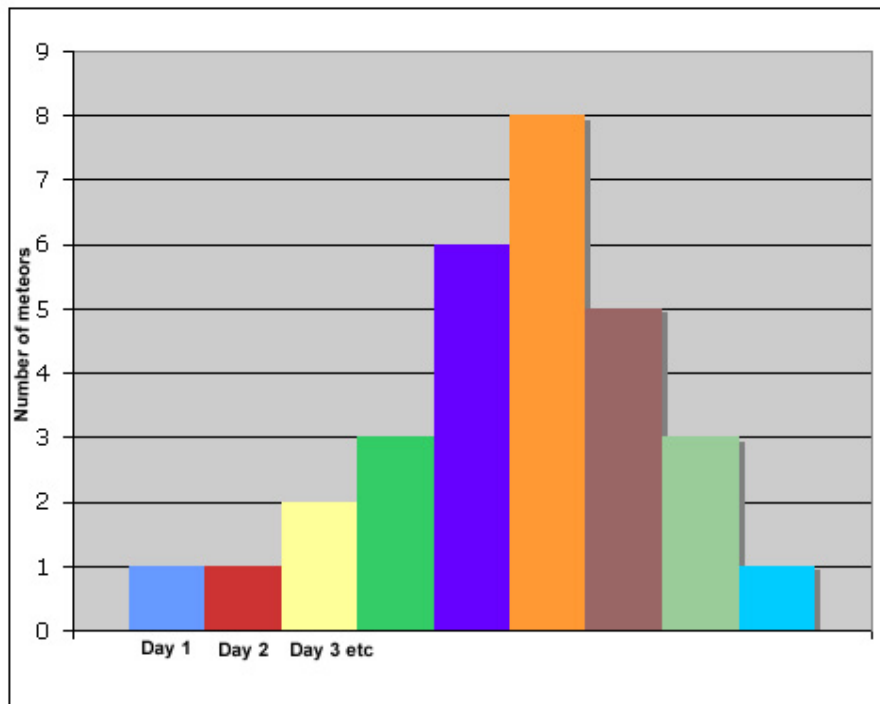
In the space below, create a tally of the number of meteors falling within each bin.

Date	Dec 9	Dec 10	Dec 11	Dec 12	Dec 13	Dec 14	Dec 15	Dec 16	Dec 17
Count	1	1	2	3	6	8	5	3	2

How many bins do you have? 9

In which bin did there be the fewest meteor sightings? The most? *The fewest sightings occurred on Dec 9 and Dec 10. The most sightings occurred on Dec 14.*

On the attached sheet of graph paper, plot your histogram. Remember that the number of meteors sighted should be plotted on the y-axis and the bins should be plotted on the x-axis.



On which day did the peak occur? How can you tell? *On December 14<sup>th</sup> (day 6) because the bar in the histogram is highest for that day, indicating the most meteor sightings.*

Referring to the Meteor Shower Calendar (2007), which meteor shower are these images from? *Geminids*

What is the source of the meteor shower? *3200 Phaethon (asteroid)*

# Answer Key

## Activity 2

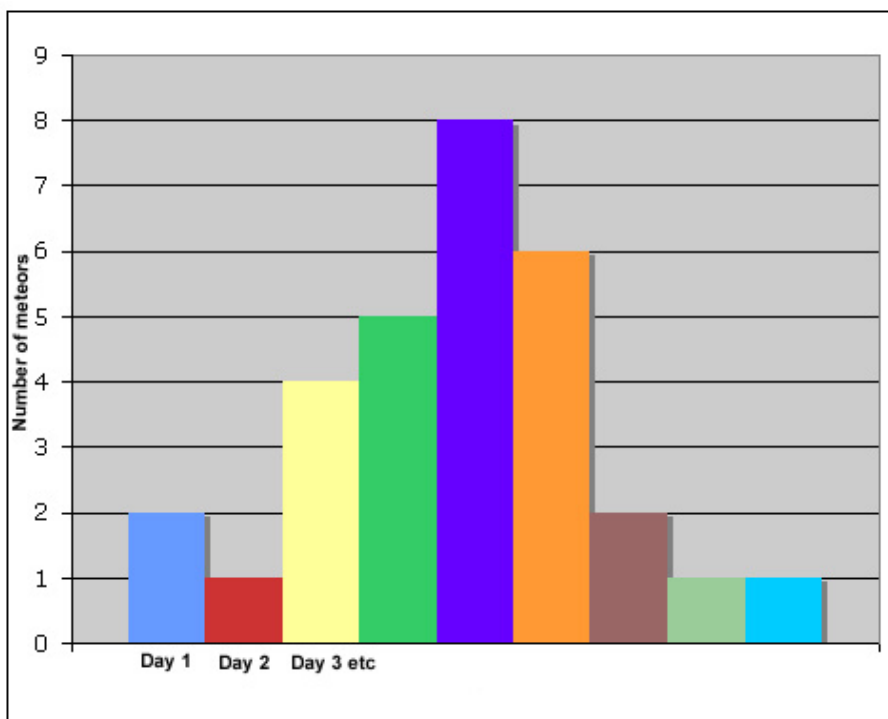
In the space below, create a tally of the number of meteors falling within each bin.

Date	Aug 9	Aug 10	Aug 11	Aug 12	Aug 13	Aug 14	Aug 15	Aug 16	Aug 17
Count	2	1	4	5	8	6	2	1	1

How many bins do you have? 9

In which bin did we have the fewest meteor sightings? The most? *The fewest sightings occurred on Aug 10, 16, and 17. The most sightings occurred on Aug 13.*

On the attached sheet of graph paper, plot your histogram. Remember that the number of meteors sighted should be plotted on the y-axis and the bins should be plotted on the x-axis.



On which day did the peak occur? How can you tell? *On August 13<sup>th</sup> (day 5) because the bar in the histogram is highest for that day, indicating the most meteor sightings.*

Referring to the Meteor Shower Calendar (2007), which meteor shower are these images from? *Perseids*

What is the source of the meteor shower? *Swift-Turtle (comet)*