6th Grade Lesson Plan Packet

5/4/2020-5/8/2020

Remote Learning Packet

Please submit scans of written work in Google Classroom at the end of the week.

May 4, 2020 - May 8, 2020

Course: 6 World Cultures

Teacher(s): Mrs. Malpiedi patricia.malpiedi@greatheartsirving.org
Mr. Loomis joseph.loomis@greatheartsirving.org

Weekly Plan:

Monday, May 4
☐ View Week 1 Packet grades and comments
☐ Review Timeline: Part II flashcards

Tuesday, May 5
☐ Complete "Italy during the Renaissance" reading and questions*

Wednesday, May 6
☐ Complete "Introduction to Early and High Renaissance Art" assignment*

Thursday, May 7
☐ Complete "Art Reflections: Part I"*
☐ Watch "Renaissance Art" Video on Google Classroom
☐ Complete "Art Reflections: Part II"*

Friday, May 8
☐ Attend Office Hours via Zoom at 10:30am (optional)
☐ Finish your 3D model of Chartres Cathedral (optional)
☐ Upload this week's work onto Google Classroom
*** This work is to be submitted on Google Classroom.*

Statement of Academic Honesty

I affirm that the work completed from the packet is mine and that I completed it independently.

_____
Student Signature

I affirm that, to the best of my knowledge, my child completed this work independently

_____
Parent Signature

Monday, May 4

1. Unless you did not turn them in, your Week 1 packets are now graded. Please go to Google Classroom to see your grade and read the teacher comments. (5 min)
2. Reflect: What did you do well in your Week 1 packet and what might you do differently?

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3. Take out your Timeline: Part II Flashcards. Put the cards in groups according to the century their events began. (Put all events that began in the 500s in one pile, in the 700s in the next pile, in the 1000s in the next pile, etc…) Then, study each pile one at a time, working to memorize the start and end dates for each event. When you have correctly recalled the dates for one entire pile, move on to the next pile. How far will you get in 15 minutes? (15 min)

Tuesday, May 5

1. Complete the "Italy during the Renaissance" reading and questions on pages 3-5 of this packet.
   You may work directly on the worksheet. If you instead use a separate sheet of paper for your answers, please include on the page a full heading and the title, and copy down the questions before answering them.

Wednesday, May 6

1. Complete the "Introduction to Early and High Renaissance Art" on pages 6-7 of this packet.

Thursday, May 7

1. Complete the "Art Reflections: Part I" on page 8 of this packet.
2. Then, go to our class on Google Classroom. Watch Mr. Loomis' "Renaissance Art" Video.
3. After, answer the "Art Reflections: Part II" questions on page 9 of this packet.
   You may work directly on the worksheet. If you instead use a separate sheet of paper for your answers, please include on the page a full heading and a title, and copy down the questions before answering them.

Friday, May 8

Please note: We will no longer have work assigned on Fridays. On those days you can instead focus on attending office hours, submitting your assignments on Google Classrooms and enjoying time away from the computer!

1. (Optional) Attend Office Hours via Zoom at 10:30am. To find the Zoom link, go to the Stream for our course on Google Classroom.
2. (Optional) Finish your 3D model of Chartres Cathedral and submit a photo of it with this packet.
3. Scan or photograph your work from this week. Save it as a single PDF file. Upload and submit that document on Google Classroom. (For a video tutorial on how to do this, please visit https://irving.greatheartsamerica.org/remotelearning/.
   Deadline: 11:59pm on Sunday, May 3rd. Have a good weekend!

_____
_____
_____

Tuesday, May 5, 2020

GreatHearts Irving

Italy During the Renaissance

Instructions: Read the passage and answer the questions in complete sentences.

Source: Kingfisher History Encyclopedia

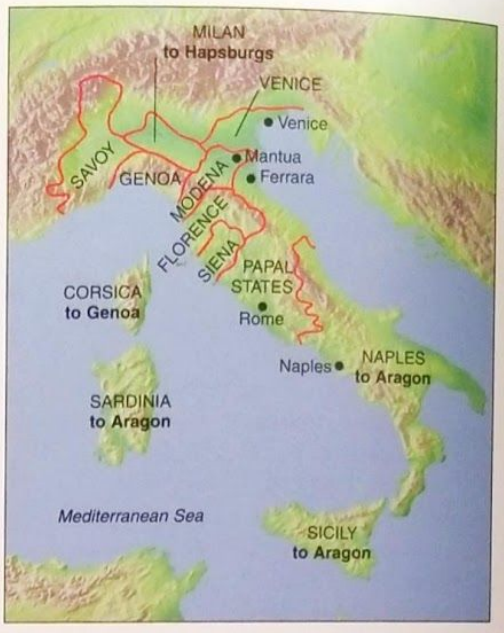
ITALY 1460–1530

During this period, Italy was divided into small states. This made for great variation—some states were progressive while others were more conservative.

To further the ambitions of her father, Rodrigo, (Pope Alexander VI), Lucrezia Borgia (1480–1519) was married three times. With her third husband, the Duke of Ferrara, she became a great patron of the arts. Their court became a magnet for artists and writers. She is also known for her devotion to causes involving children and education.

Many Italian states, such as Florence, Venice, and Rome, were really large cities. Others were ruled by dukes, as in Mantua, Milan, Urbino, and Ferrara. Most of these states were ruled by families who had grown rich from trade and commerce in the late Middle Ages.

The most powerful family of the time was the Medici family of Florence. They had made a great fortune during the 1300s through banking and moneylending. The best known of the Medicis is Lorenzo, who became joint ruler of Florence with his brother in 1469. He was a cunning statesman and banker as well as a patron of writers, artists, philosophers, and scientists. He was eager to promote his family and saw his second son become pope. Under Lorenzo's influence, Florence became one of the most beautiful and prosperous cities in Italy, and a center of the Renaissance. Lorenzo helped make the form of Italian spoken in Florence into the language of the whole country.



During the Middle Ages, much of Italy was controlled by the Holy Roman Empire. Following a power struggle between emperors and popes, many cities formed their own independent states.

Another family, the Borgias, sought power through the Church and the military. Two Borgias became pope. One of them, Rodrigo, schemed to help his children. When he died, the family's power collapsed.

1. Let's trace the various rulers and forms of power in Italy's history:
    a. Who had the most power during the Roman Empire?

    b. Who had the most power during the Roman Republic?

    c. Who had the most power during the Middle Ages?

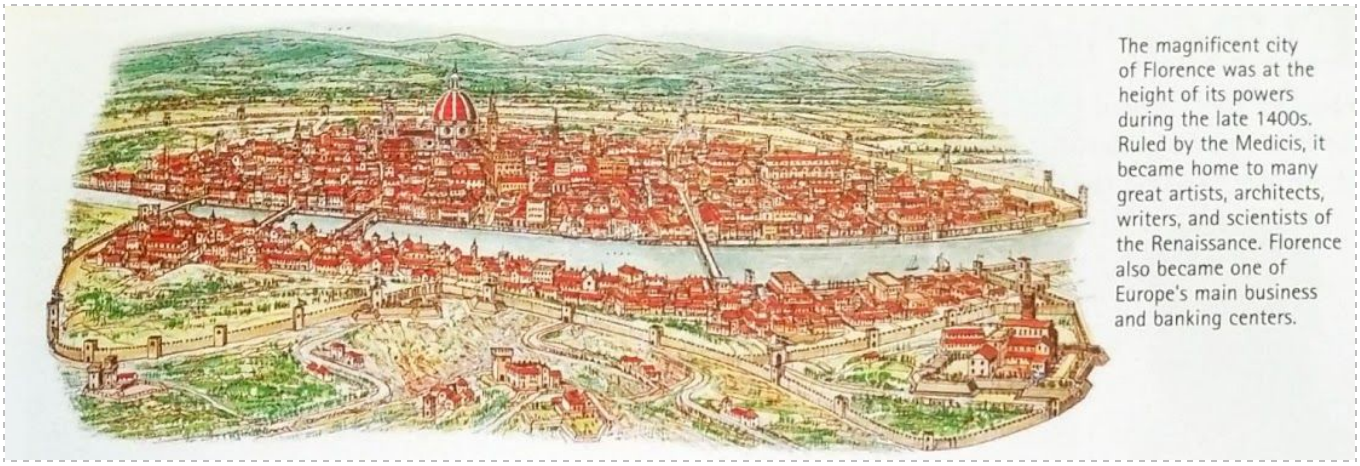
    d. Who had the most power during the Renaissance?

The Medici villa at Florence was built in 1480 for Lorenzo the Magnificent by Renaissance architect Giuliano da Sangallo.

LORENZO DE' MEDICI

In 1469, when he was 20 years old, Lorenzo became joint ruler of Florence with his brother Giuliano. He was the grandson of Cosimo de' Medici, who was the second Medici to hold power in Florence. Lorenzo's brother was killed in a plot by a rival family in 1478. Lorenzo did everything he could to further his family's interests—his second son Giovanni became Pope Leo X—and to build a large gathering of scholars and creative people. He was the first patron of the artist Michelangelo. He maintained and expanded the family traditions of banking and government.

Lorenzo de' Medici (1449–1492)—"The Magnificent"—ruled Florence from 1478 to 1492.



The magnificent city of Florence was at the height of its powers during the late 1400s. Ruled by the Medicis, it became home to many great artists, architects, writers, and scientists of the Renaissance. Florence also became one of Europe's main business and banking centers.

2. Why were Lorenzo de Medici and his family so powerful? (Name at least three reasons)

3. What was so special about the city of Florence during this time?

The Sforzas were a great family of Milan. Ludovico Sforza (1452–1508), was a man of taste, but also one with ruthless ambition. He ruled as regent for his nephew, the duke of Milan, but made himself the real center of power. He made alliances with Rodrigo Borgia and married a daughter of the powerful d'Este family, from Ferrara. Ludovico's court attracted great artists from all fields, among them Leonardo da Vinci.

Families like the Medicis represented "new money," with new values and ideas. They paid for exploration, centers of learning, public works, and new, imported products. People traveled to Italy to learn new ideas, which were taken back to other parts of Europe, and Europeans flocked to Florence, Venice, and Milan to gain support for their own ideas. Although future centers of modern development were to be in northwestern Europe, much of the energy of the early Renaissance came from the city-states of Italy.

Raphael was influenced by the work of Da Vinci and Michelangelo in Florence. This is his "Deposition of Christ," which he painted in 1507 at the age of 24. The following year Pope Julius II asked him to do a major work in the Vatican in Rome.

Wealthy Renaissance people enjoyed a very comfortable life. In addition to palaces or large city residences, many had country villas where they welcomed groups of visitors. They would spend time hunting, holding parties, discussing literature, and writing poetry.

4. Who were other powerful families of Italy during the Renaissance?

5. What did wealthy people do in their spare time?

_____

_____

_____

Wednesday, May 6, 2020

GreatHearts Irving

Introduction to Early and High Renaissance Art

Instructions: Complete the reading below and answer the questions which follow in complete sentences.
Source: Gardner's Art Through the Ages

THE EARLY RENAISSANCE (1400s)

In the Early Renaissance period, Florence is like a new Athens. John Addington Symonds writes, "…nowhere else except at Athens has the whole population of a city been so permeated with ideas, so highly intellectual by nature, so keen in perception, so witty and so subtle, as at Florence … The primacy of the Florentines in literature, the fine arts, scholarship, philosophy, and science was acknowledged throughout Italy." After the repulsion of the Dukes of Milan, the Medicis -- bankers to all of Europe and lavish patrons -- gain power and rule Florence. Giovanni de Medici has an established fortune. His son, Cosimo de Medici is considered the father of his country and the first major patron of artists and scholars. He begins the public library in Florence and, thanks to his tutor Marsilio Ficino -- a Neoplatonist -- begins reading Plato in his old age. Cosimo de Medici's grandson Lorenzo "the Magnificent"-- a poet and even greater patron to Florence -- benefits from this education. He is educated in the study of the Humanities, which involves the study of languages and literatures, the arts, history, and philosophy. Lorenzo surrounds himself with artists and scholars and supports Ficino's Platonic Academy of Florence. His death in 1492 marked what Italians saw as the end of a Golden Age: Italy is then invaded by France, Spain and the Holy Roman Empire.

Major artists of this time:

- Sculpture: Donatello, Verrochio
- Architecture: Brunelleschi, Alberti
- Painting: Masaccio, Piero della Francesca, Fra Angelico, Ghirlandaio, Botticelli, Perugino, Mantegna

THE HIGH RENAISSANCE (1494 - 1527)

At the beginning of the High Renaissance period, Florence has lost its political and economic power and Rome replaces it as the cultural center of Italy. The Papal State, whose capital is Rome, becomes a strong political force in Italy and Europe due to powerful and ambitious popes: Alexander VI (Borgia), Julius II, Leo X (Medici), and Clement VII (Medici). The notable artists of this time -- Leonardo da Vinci, Raffaello Sanzio (or Raphael)l and Michelangelo owe most of their careers to the influence of Florence and the patronage of popes and other patrons (like the Duke of Milan.) Neoplatonism is still strong during this time.

"All good poets compose their beautiful poems not by art, but because they are inspired and possessed. …. For not by art does the poet sing, but by power divine." -- Plato's Ion

1. What were the most important Italian cities during the Renaissance?

2. What kind of education did Lorenzo de Medici receive, and why do you think that information was considered important enough to mention in the article? (2 sentences minimum)

3. Which ancient philosopher would you say had the biggest impact on the Medici family and in the Renaissance in general?

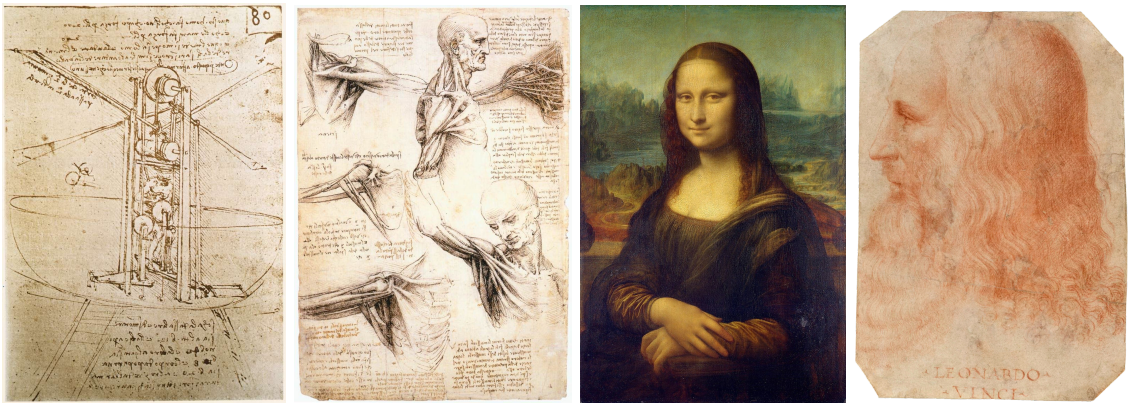
4. What is Neoplatonism? (Start with defining the root *neo.*)

5. Based on what you read, how would you define "patron" and who were the biggest patrons of the Renaissance?

LEONARDO DA VINCI (1452-1519)

Leonardo da Vinci was one of the earliest and most influential artists of the High Renaissance. He influenced nearly everyone who followed him. He is considered a "Universal man," an artist genius, and wrote many notes on almost every subject: botany, geology, zoology, hydraulics, military engineering, animal lore, anatomy, physical sciences (mechanics, light, optics, color, perspective). He possessed a desire to discover the law of the underlying flux and processes of nature, and insisted that all of his research made him a better painter: he stated, "Reality in absolute sense is inaccessible to man and … we can know it only through changing images."

He originally trained with the sculptor Verrochio in Florence before moving to Milan. He spent the last days of his life in France. He completed few surviving works, and much of what we know about this "Universal man" is from his notebooks. Some of his important works, in chronological order, were "The Virgin of the Rocks", the drawing of the Virgin and Child, "The Last Supper", and the "Mona Lisa". Samples of his art and studies:



Machines and science (anatomy), painting (Mona Lisa) and Leonardo's portrait (by Francesco Melzi).

_____

_____

_____

Thursday, May 7, 2020

GreatHearts Irving

“Art Reflections: Part I”

Instructions: You are going to make brief observations about each image. Spend just two minutes per image writing down what you see (shapes, colors, architectural features, people, materials… anything.)

"Art Reflections: Part II"

Instructions: Answer these questions in complete sentences *after* you have watched the video on Google Classroom.

1. What are the three forms of art that Mr. Loomis describes?

2. Who are the three artists featured in the video? Please also write their names and the title of their work of art next to its image on the previous page.

3. For each piece of art, name something you learned from Mr. Loomis' lesson that you did not know or notice when you viewed the art yesterday. (minimum 3 sentences)

Remote Learning Packet

Please submit scans of written work in Google Classroom at the end of the week.

May 4-8, 2020

Course: 6 Latin

Teacher(s): Miss Salinas annie.salinas@greatheartsirving.org
Ms. Baptiste deborah.baptiste@greatheartsirving.org

Weekly Plan:

Monday, May 4
☐ Optional: Watch the intro video for today on Google Classroom
☐ Complete the worksheet for *anulus Aegyptius,* l. 1-9

Tuesday, May 5
☐ Optional: Watch the intro video for today on Google Classroom
☐ Complete the worksheet for *anulus Aegyptius,* l. 10-21

Wednesday, May 6
☐ Optional: Watch the intro video for today on Google Classroom
☐ Complete the worksheet for *anulus Aegyptius,* l. 22-29

Thursday, May 7
☐ Watch the optional intro video for today on Google Classroom
☐ Complete the worksheet for *contentio*

Friday, May 8
☐ attend office hours
☐ catch-up or review the week's work

Statement of Academic Honesty

I affirm that the work completed from the packet is mine and that I completed it independently.

_____
Student Signature

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_____
Parent Signature

Salvete, discipuli! Welcome to Week 6 of remote learning! We have several new things this week. First, you might notice that the whole packet is posted this week instead of individual assignments. It was getting complicated with all the ways to complete assignments for different classes, so now it is much simpler. However, we do have one new thing on the Google Classroom this week: videos from your teachers! Log on each day to see an optional video from Miss Salinas and/or Ms. Baptiste.

Monday, May 4

Remember how we learned a while back that the Romans were superstitious people who believed in ghosts, werewolves, and lucky and unlucky charms? This week, we have a new story, *anulus Aegyptius*, with a mysterious object: an ancient ring! But will it bring good luck or bad luck to its wearers?

→ Watch the intro video on Google Classroom (optional), then complete the questions on today's worksheet.

Tuesday, May 5

anulus Aegyptius continues today as we find out what happens to the innkeeper and his wife now that they own the ring. *ēheu! quam infelix sunt!*

→ Watch the intro video on Google Classroom (optional), then complete the questions on today's worksheet.

Wednesday, May 6

anulus Aegyptius comes to a dramatic end today as the ring finds a new owner. *ēheu,* I hope the bad luck doesn't follow them into Caecilius' house...

→ Watch the intro video on Google Classroom (optional), then complete the questions on today's worksheet.

Thursday, May 7

Now that we're finished with our story, we're going back to something we saw in the model sentences for this chapter: Romans and Greeks debating who is the best!

→ Watch the intro video on Google Classroom (optional), then complete the worksheet *contentio*.

Friday, May 8

Euge, no more new work on Fridays! You can use today to catch up on anything you might have missed, or to upload your completed packet to the Google Classroom (it's due on Sunday night at midnight).

If you have questions, comments, ideas, or want to see my lovely face, attend Office Hours today at 9:00am by following the link in the stream of our Google Classroom. See you there!

Monday

Story questions: *anulus Aegyptius*, l. 1-9

Open your red book to page 140. Then complete this worksheet. As you read the Latin story, read it out loud to see if you can pronounce each of the words.

1. What does the title of this story mean?

"The _____ _____"

(Look at the picture on p. 141 to see an actual **anulus Aegyptius**.)

2. The story began with Syphāx. Who is he? (Hint: If you don't remember, look at page 21.)

Provide the both the Latin and English answers:

Syphāx est _____ / Syphax is a _____

3. Where was Syphax, and what was he doing? (back to page 140, line 1)

_____

4. A **caupō** is an innkeeper. It is a 3rd declension noun. Decline this noun by providing the missing parts:
(Pay attention to the clues given below. If you have trouble remembering the endings, check pg. 121.)

Case	*Singular*	*Plural*
Nominative	caupo	
Dative		
Accusative		caupōnēs

5. Why did Syphax hand over a ring to the innkeeper? (lines 3-4) He said,

"pecuniam non habeo quod Neptunus navem meam delevit."

"I don't have _____ because _____ _____my

_____."

6.When the innkeeper accepted the ring, what did he do with it? (line 5)

_____

7. What adjective did both he and Syphax use to describe the ring?

Latin *English*

_____ _____

8. How had Syphax acquired* the ring? (line 7-8) (**acquired: gotten)*

_____

9. Where had the ring originally been found? (line 8-9)

_____

10. **invenit** means "he/she found." Translate different forms of this verb below.

invenit: invēnit *(the only difference between the present and the perfect tense is a longer-sounding e**)***

Cavē! *(That's Latin for **be careful!**)* Watch the endings! Who is doing each action?

a) inven**ītis**_____ (present tense)

b) invēn**ērunt** _____ (perfect tense)

c) inveniē**bāmus** _____ (imperfect tense)

Tuesday

Story questions: *anulus Aegyptius*, l. 10-21

Open your red book to page 140. Then complete this worksheet. As you read the Latin story, read it out loud to see if you can pronounce each of the words.

1. What did the innkeeper do with the ring when he returned home? (line 11)

_____

2. **anulus eam delectavit** (line 12). Whom does "eam" refer to? _____

3. **uxor postridie ad urbem contendebant** (line 13). Whom did his wife meet in the next sentence?

_____

4. (Lines 14-15) **femina, quod erat perterrita, servo pecuniam dedit.** Why did the woman give money to the slave? *(It gives the reason in the sentence in bold.)*

   Because she was _____.

5. What did the slave catch sight of and demand next? (lines 15-16) _____

6. **femina ad tabernam rediit et maritum quaesivit.** How do you think the woman was feeling at this point? Circle one (or two) of the following and explain your answer.

   happy scared sad angry guilty

_____

_____

_____

_____

ēheu! Once the innkeeper's wife found her husband, they realized something horrible was happening!

7. What did the innkeeper see? (middle of line 18) _____

8. What was happening? (end of line 18)_____

femina marito rem totam *(the whole story)* **narravit.** (line 19)

9. What was "the whole story" that the wife told?

_____

_____

10. What was the conclusion the innkeeper reached after hearing this whole story (line 20)?

"The _____ is _____."

caupo: "anulus tabernam meam delevit." (lines 20-21)

11. What does he mean by that? How could a ring destroy an inn?

_____

_____

Comparing luck

Several people in this chapter have had bad luck. Using the adjective **infelix, infelicem** - unlucky, *add the correct degree of unluckiness to each sentence.*

Positive degree: no change *Comparative degree: add -ior to stem* *Superlative degree: add -issimus to stem*

Quintus controversiam āmīsit *(lost)*. Quintus _____ erat. (positive)

Syphax navem suam āmīsit. Syphax _____ erat. (comparative; use infelic- as the stem)

caupo tabernam suam āmīsit in incendio. caupo _____ erat. (superlative; use infelic- as the stem)

Wednesday

anulus Aegyptius, l. 22-29 (pg. 141)

This section of the story has a lot of action - it just begs to be illustrated. Here's a chance to do just that. Read the sentence for each box and create a cartoon based on the sentence. You may choose to differentiate characters by giving them different clothes, hair, etc. The characters in this section of the story are:

servus ingens **tres servi (inimici)** **Grumio** **Poppea**

Servus ingēns, postquam pecūniam et anulum cēpit, ad urbem contendit.	Subitō trēs servōs cōnspexit. Servī inimīcī erant.	Inimīcī (trēs servī), postquam pecūniam conspexērunt, servum verberābant.
servus fūgit, sed ānulum āmīsit.	Grumiō cum Poppaeā ambulābat.	(Grumiō) ānulum invenit.

Words to help:

capit: cēpit *takes: took* **verberat:verberavit** *beats: beat*

inimīcī *enemies* **fugit: fūgit** *flees: fled* **āmīsit** *lost*

“Quid vidēs?” rogāvit Poppaea.	“ānulum videō,” inquit. “anulus Aegyptius est.”	“euge!” inquit Poppaea. “ānulus fēlix est.”

1. Poppaea thought the ring was **lucky**. Who had the **<u>opposite</u>** opinion earlier in the story? (line 20)

_____

2. Who was right? _____

Give a reason for your answer:

_____

_____

_____

Thursday

contentio (an argument between a Greek and a Roman)

Circle one:

1. *If a verb ends with* -mus*, who is doing the action?* I you we

2. *If a verb ends with* -tis*, who is doing the action?* he, she, it y'all they

Now, translate the verbs below, keeping in mind the answers you circled above.

docēmus _____	
pingimus _____	*spectātis* _____
aedificāmus _____	*accipitis* _____
sumus _____	*pugnātis* _____
servāmus _____	*habētis* _____
facimus _____	*audītis* _____
superāmus _____	*estis* _____
labōrāmus _____	

The dialogue on the next page is an argument between a Greek and a Roman. Now that you know what the Latin words in the box above mean, complete the sentences below with Latin words from the box above. You will use each Latin word once. When you are done, translate each sentence.

HINT:

If the speaker is talking about their own culture, using the pronoun "nos"/"we", which verb ending will they use? _____

If the speaker is talking TO someone about that person's culture, using the pronoun "vos"/"ya'll", which verb ending will they use? _____

HINT #2:

This dialogue is very similar to our Stage 10 model sentences. If you get stuck or would like to see pictures that might help you place and translate the verbs, open your red book to pgs. 132-135.

Roman: **nōs Rōmānī viās et pontēs _____.**

We _____ _____ roads _____ bridges.

Greek: **sed nōs Graecī statuās _____. nōs pictūrās _____.**

But we _____ _____ statues. We _____ pictures.

Roman: **vōs semper āctōrēs _____. vōs estis ignāvī. nōs Rōmānī dīligenter _____.**

Y'all _____ _____ actors. Y'all _____ lazy. We _____ _____ diligently.

Greek: **vōs estis barbarī quod semper _____.**

_____ *are* _____ *because you* _____ _____.

Roman: **vos _____ turbulentī quod semper contentiōnēs _____. nōs Rōmānī pācem _____.**

Y'all _____ disorderly _____ y'all always _____ arguments. _____ _____ preserve the _____.

Greek: **sed vōs semper praemium _____.**

_____ *y'all* _____ *accept the* _____.

Roman: **nōs Rōmānī _____ fortissimī. nōs Graecōs semper _____.**

We Romans _____ _____ _____. We always

_____ the _____.

Greek: **vōs tamen rhētorēs Graecōs _____. nōs Graecī Rōmānōs**

_____. nōs sumus auctōrēs.

_____ however _____ _____ Greek _____. We

_____ _____ the Romans. _____ _____ creators.

Whom do you think has won the argument: the Roman or the Greek? Explain your answer.

_____

_____

_____

Remote Learning Packet

Please submit scans of written work in Google Classroom at the end of the week.

May 4-8, 2020

Course: 6 Literature & Composition

Teacher(s): Ms. Arnold jacqueline.arnold@greatheartsirving.org
Ms. Brandolini catherine.brandolini@greatheartsirving.org

Weekly Plan:

Monday, May 4
☐ read & annotate "A Line-Storm Song"
☐ complete Grammar Phrases Review Worksheet 1

Tuesday, May 5
☐ practice poem
☐ compete Grammar Phrases Review Worksheet 2

Wednesday, May 6
☐ practice poem
☐ take Grammar Phrases: Part 1 assessment on Google Classroom

Thursday, May 7
☐ practice poem
☐ take Grammar Phrases: Part 2 assessment on Google Classroom

Friday, May 8
☐ attend office hours
☐ catch-up or review the week's work

Statement of Academic Honesty

I affirm that the work completed from the packet is mine and that I completed it independently.

I affirm that, to the best of my knowledge, my child completed this work independently

_____
Student Signature

_____
Parent Signature

Monday, May 4

Today we begin learning a new poem: “A Line-Storm Song” by Robert Frost. Either print or copy carefully in your neatest handwriting the new poem. Watch the video on Google Classroom (GC) to see the poem and hear it being read aloud. Read through the poem aloud at least twice. You do not need to annotate the poem, but you should look up any words you do not know.

Today and tomorrow will be spent reviewing phrases in preparation for a grammar assessment on Wednesday and Thursday. Please watch the “Grammar Phrase Review: Part 1” video in GC to review these concepts and then complete the Grammar Phrases Review Worksheet 1.

Tuesday, May 5

Recite the poem aloud at least two times. Remember to follow the punctuation of the lines, to pronounce each word clearly, and to avoid a monotone recitation! You can recite along with the recording on GC!

Today will be spent reviewing phrases in preparation for a grammar assessment on Wednesday and Thursday. Please watch the “Grammar Phrase Review: Part 2” video in GC to review these concepts and then complete the Grammar Phrases Review Worksheet 2.

Wednesday, May 6

Recite the poem aloud at least two times. Remember to follow the punctuation of the lines, to pronounce each word clearly, and to avoid a monotone recitation! You can recite along with the recording on GC!

Go to Google Classroom and take today’s assessment: Grammar Phrases: Part 1.

Thursday, May 7

Recite the poem aloud at least two times. Remember to follow the punctuation of the lines, to pronounce each word clearly, and to avoid a monotone recitation! You can recite along with the recording on GC!

Go to Google Classroom and take today’s assessment: Grammar Phrases: Part 2.

Friday, May 8

There is no lesson for today. Take advantage of this time to catch-up on any late work, to review any concepts you are unsure of, and to attend Literature office hours (12:00-12:30; Zoom link is in GC). Have a lovely and relaxing weekend!

_____
_____
_____
_____

GreatHearts Irving

A Line-Storm Song

By Robert Frost

The line-storm clouds fly tattered and swift,
 The road is forlorn all day,
Where a myriad snowy quartz stones lift,
 And the hoof-prints vanish away.
The roadside flowers, too wet for the bee,
 Expend their bloom in vain.
Come over the hills and far with me,
 And be my love in the rain.

The birds have less to say for themselves
 In the wood-world's torn despair
Than now these numberless years the elves,
 Although they are no less there:
All song of the woods is crushed like some
 Wild, easily shattered rose.
Come, be my love in the wet woods; come,
 Where the boughs rain when it blows.

There is the gale to urge behind
 And bruit our singing down,
And the shallow waters aflutter with wind
 From which to gather your gown.
What matter if we go clear to the west,
 And come not through dry-shod?
For wilding brooch shall wet your breast
 The rain-fresh goldenrod.

Oh, never this whelming east wind swells
 But it seems like the sea's return
To the ancient lands where it left the shells
 Before the age of the fern;
And it seems like the time when after doubt
 Our love came back amain.
Oh, come forth into the storm and rout
 And be my love in the rain.

_____
_____
_____
_____

GreatHearts Irving

Grammar Phrases Review Worksheet 1

I. VERB PHRASES *Write the verb phrase below each sentence given.*

By the time summer is over, we will have spent three weeks at the beach.

1. Verb Phrase: _____

For how long have you played football?

2. Verb Phrase: _____

The Rat, astonished and dismayed at the violence of Mole's paroxysm of grief, did not dare to speak for a while.

3. Verb Phrase: _____

" We will bring him back to reason, by force if need be" (43).

4. Verb Phrase: _____

Since early morning he had been swimming in the river, in company with his friends the ducks.

5. Verb Phrase: _____

II. PREPOSITIONAL PHRASES *Identify the prepositional phrase in each sentence, and state whether it is adverbial or adjectival.*

The Rat was sitting on the river bank, singing a little song.

1. Prepositional Phrase: _____
2. Adverbial or adjectival: _____

The Rat brought the boat alongside the bank.

3. Prepositional Phrase: _____
4. Adverbial or adjectival: _____

"Why, sometimes I dream of the shell-fish of Marseilles…" *There are 2 prepositional phrases in this sentence.*

5. Prepositional Phrase: _____
6. Adverbial or adjectival: _____

7. Prepositional Phrase: _____
8. Adverbial or adjectival: _____

Row nearer. Mole, nearer to the reeds! It is hard to catch, and grows each minute fainter.

9. Prepositional Phrase: _____
10. Adverbial or adjectival: _____

III. APPOSITIVE PHRASES *Identify the appositive/appositive phrase of each sentence.*

Anne, a rather whimsical young girl, had a habit of getting herself into scrapes.

1. Appositive/appositive phrase: _____

The female protagonist La Esmeralda is one of Victor Hugo's most fascinating characters.

2. Appositive/appositive phrase: _____

Henry David Thoreau, a renowned Transcendentalist, is the author of *Walden*.

3. Appositive/appositive phrase: _____

The Scottish author Kenneth Grahame was born in 1859 and wrote, among many other works, *The Wind in the Willows,* which was published in 1908.

4. Appositive/appositive phrase: _____

London, a city of nearly nine million people, underwent the Great Fire of London in 1666, which lasted nearly four days.

5. Appositive/appositive phrase: _____

_____
_____
_____
_____

GreatHearts Irving

Grammar Phrases Review Worksheet 2

I. PARTICIPLES & PARTICIPIAL PHRASES *Side bracket each participle or participial phrase and fill in the chart.*

1. The cat was hiding from the pouring rain.

participle	word modified	type of participle	base verb

2. We carefully avoided the broken glass.

participle	word modified	type of participle	base verb

3. The rising tide washed over the crowded beach.

participle	word modified	type of participle	base verb

4. The babbling brook was running down the hill towards the quickly rotating mill-wheel.

participle	word modified	type of participle	base verb

II. GERUNDS & GERUND PHRASES *Side bracket the gerund or gerund phrase and fill in the chart.*

5. Cordelia enjoys sketching flowers.

gerund	job in the sentence	base verb

6. The easiest part of the project is cutting out the pattern.

gerund	job in the sentence	base verb

7. The loud ringing of my alarm wakes me up every morning.

gerund	job in the sentence	base verb

8. Neglecting to study hurt his grades and prevented his knowledge from growing.

gerund	job in the sentence	base verb

III. WHOLE SENTENCE ANALYSIS *Fill in the blanks to analyze the elements of the sentence below.*

Ms. Brandolini and Ms. Arnold, our Literature teachers, love discovering interesting words.

9. Simple Subject: _____
10. Simple Predicate: _____
11. Complement: _____
12. Type of Complement: _____
13. Appositive phrase: _____
14. Participle: _____
15. Gerund phrase: _____

GreatHearts Irving

Remote Learning Packet

Please submit scans of written work in Google Classroom at the end of the week.

May 4-8, 2020

Course: Math Fundamentals

Teacher(s): Ms. Schweizer rose.schweizer@greatheartsirving.org

Weekly Plan:

Monday, May 4
☐ Read Pages 1-3
☐ Section 11.8 pg. 390 4-14 even
☐ Section 11.9 pg. 394 2-12 even

Tuesday, May 5
☐ Read Pages 4-6
☐ Watch Video on GC
☐ Section 11.9 pg. 394 19-37 odd

Wednesday, May 6
☐ Read Pages 7-9
☐ Section 11.9 pg. 395 39-46 all

Thursday, May 7
☐ Pages 10-12
☐ Watch Video on GC

Friday, May 8
☐ Attend office hours
☐ Catch-up or review the week's work

Statement of Academic Honesty

I affirm that the work completed from the packet is mine and that I completed it independently.

I affirm that, to the best of my knowledge, my child completed this work independently

_____
Student Signature

_____
Parent Signature

Monday, May 4

Today is review for last Thursday and Friday's lessons about graphing on the coordinate plane. Read pages 1-3 in the packet and complete the exercises on graph paper.
Head's up: next Monday and Tuesday you will have an assessment over Chapter 11, so take this time to review carefully.

Tuesday, May 5

Today is a continuation of graphing equations on the coordinate plane. Read pages 4-6 in the packet and complete the exercises on graph paper. Make sure to watch the instructional video on Google Classroom found under the Week 6 Topic.

Wednesday, May 6

This is the last lesson in Chapter 11. Today we are learning about graphing equations that do not form straight lines. Read pages 7-9 in the packet and complete the exercises on graph paper.

Thursday, May 7

I recommend printing out today's lesson (pages 10-12) if that is possible for you so that you have the review sheet and can work on the sheet itself and fill in the blanks wherever necessary. If that is not possible, copy down the questions on a separate sheet of paper, including the fill in the blanks. Watch the instructional video on Google Classroom.
Remember, take note of your questions and email me or ask during Friday's office hours.

Friday, May 8

Take time to go back and review your work from this week. Try to fix any mistakes and send me an email if there is still something that you are confused about. Next Monday and Tuesday you will have an assessment (split into two parts) over Chapter 11. If you are able, come to Office Hours at 9:30 to ask questions.

Answer Key:

Monday:

Since I have assigned the even exercises the answers are not in the back of the book. I can't easily create an answer key for graphs, but all of the equations should make a straight line on the graph. If they do not, check your calculations again.

Tuesday:

Correct the ones that are in the back of the book. If it is not in the back of the book, make sure that the graph is a straight line.

Wednesday:

All of your graphs should form a parabola. If it does not, check your work again.

Thursday:

I will give you an answer key, but not just yet. Hang tight.

1 Monday Recap

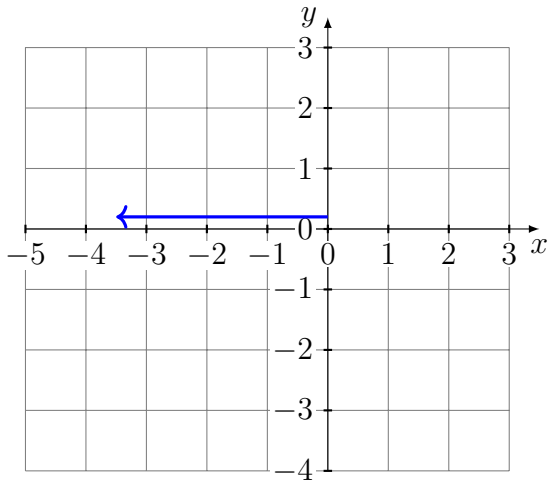
Before we dive into the new material for this week, let's review what we learned last week.

1.1 The Coordinate Plane

On Thursday we introduced the **coordinate plane**, which we use to create graphs. Each place in the coordinate plane has a specific name, or **coordinate** which is written using **ordered pairs**.

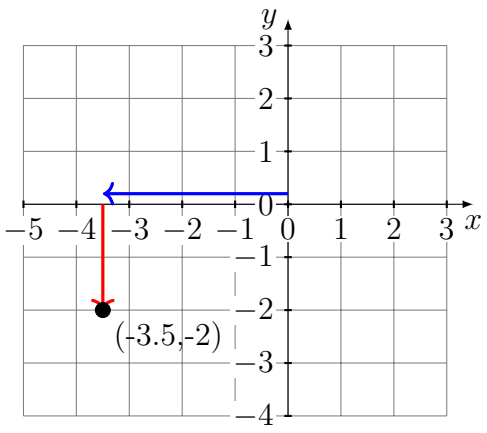
In what order are **ordered pairs** written in?

Let's practice graphing the point (-3.5, -2). Recall that the first number corresponds to the **x-axis**, the horizontal axis:



First we find -3.5 on the x-axis. Next, we move on to the second number that corresponds to the **y-axis**.

We move along the vertical axis until we reach -2. Then we graph our point!



1.2 Graphing Equations

On Friday we moved from graphing points to graphing lines, the relationship between two variables. If we have an equation with two unknown variables like

$$x + 1 = y$$

both variables can represent many different numbers. However, if we choose a value for one of them, for example:

$$x = -4$$

then we can find out the value of the other variable:

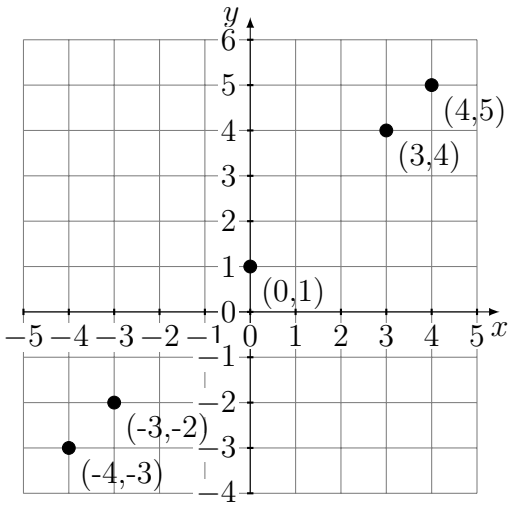
$$-4 + 1 = -3$$

$$y = -3$$

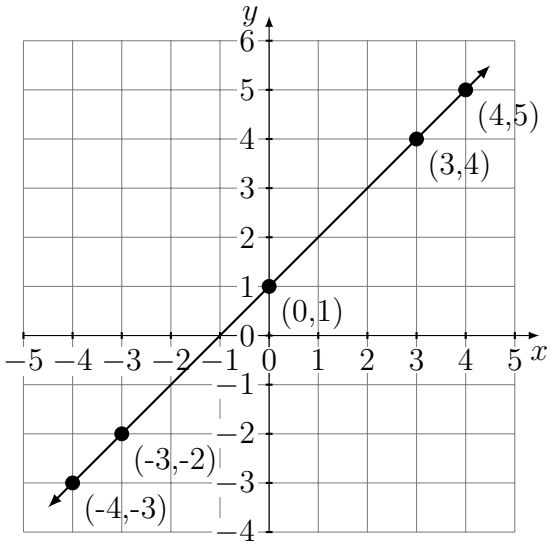
An easy way to organize this relationship is with a table.

x	$x + 1 = y$	Ordered Pair
-4	$-4 + 1 = -3$	(-4, -3)
-3	$-3 + 1 = -2$	(-3, -2)
0	$0 + 1 = 1$	(0, 1)
3	$3 + 1 = 4$	(3, 4)
4	$4 + 1 = 5$	(4,5)

An easy way to visualize the relationship is to graph the ordered pairs on the coordinate plane.



Now we can see that the relationship forms a straight line on the coordinate plane. Any point on the line will make our equation $x + 1 = y$ a true statement.



2 Graphing Equations with Multiple Operations

All of the equations with two variables we have graphed until now have only had addition and subtraction. Today we are going to try more complicated equations with multiplication and division. Fortunately, the process is exactly the same.

2.1 Multiplication

Let's consider the equation

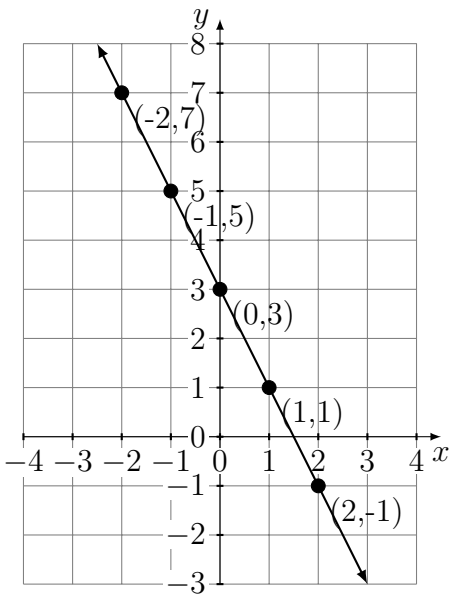
$$y = -2x + 3$$

Now, we have two variables which can represent many numbers, so lets make a table to organize the possibilities like we did before.

x	$-2x + 3 = y$	(x, y)
-2	$-2(-2) + 3 = 4 + 3 = 7$	(-2, 7)
-1	$-2(-1) + 3 = 2 + 3 = 5$	(-1, 5)
0	$-2(0) + 3 = 0 + 3 = 3$	(0, 3)
1	$-2(1) + 3 = -2 + 3 = 1$	(1, 1)
2	$-2(2) + 3 = -4 + 3 = -1$	(2, -1)

Now that we know a few of the possible values for x and y, we can graph the points just like we did before. Our steps are the same:

1. Choose a value for x.
2. Evaluate the equation to find out the value of y.
3. Write the ordered pair.
4. Graph the line formed by the ordered pairs.



2.2 Multiplication 2.0

What if instead of multiplication by a whole number x is multiplied by a fraction? Consider the equation

$$y = \frac{1}{3}x - 3$$

What if we choose $x = 1$? Then we have

$$y = \frac{1}{3}(1) - 3$$

$$y = \frac{1}{3} - 3$$

$$y = -2\frac{2}{3}$$

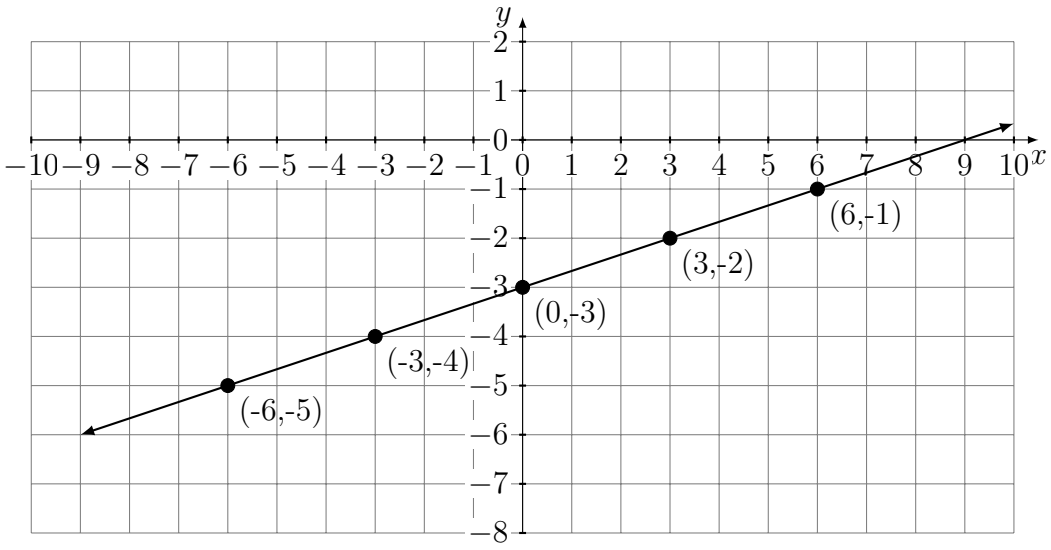
which is not an integer and would be difficult to graph. How can we make this easier to graph?

In this case, we have $\frac{1}{3}x$ or $\frac{x}{3}$. What is another way we can write $\frac{x}{3}$? Recall that a fraction bar can be rewritten as a division sign, so we are really dealing with $x \div 3$.

In order to get integers to graph, let's choose values for x which are easily divisible by 3.

x	$\frac{1}{3}x - 3 = y$	(x, y)
-6	$\frac{1}{3}(-6) - 3 = -2 - 3 = -5$	(-6, -5)
-3	$\frac{1}{3}(-3) - 3 = -1 - 3 = -4$	(-3, -4)
0	$\frac{1}{3}(0) - 3 = 0 - 3 = -3$	(0, -3)
3	$\frac{1}{3}(3) - 3 = 1 - 3 = -2$	(3, -2)
6	$\frac{1}{3}(6) - 3 = 2 - 3 = -1$	(6, -1)

Now we have integer **coordinates** which are easily graphed.



When we are multiplying by a fraction (i.e. dividing) the steps we take do not change. However, we can make the calculations and graphing easier by choosing our values for x carefully.

2.3 Instructional Video

Log on to Google Classroom and watch the Instructional video for Tuesday.

3 Graphing Nonlinear Equations

Up until today, all of the equations we have graphed have been *linear*, that is they formed straight lines on the coordinate plane. Today we are going to look at a *nonlinear* equation.

3.1 Exponent Review

Recall that the **exponent** of a number tells us how many of that number we are multiplying together.

Ex.

$$8^4$$

$$8 \times 8 \times 8 \times 8$$

$$64 \times 64$$

$$4,096$$

Evaluate the following expressions:

1. 4^3
2. 15^2

3.2 Parabolas

Let's consider the equation

$$y = x^2$$

which can also be written as

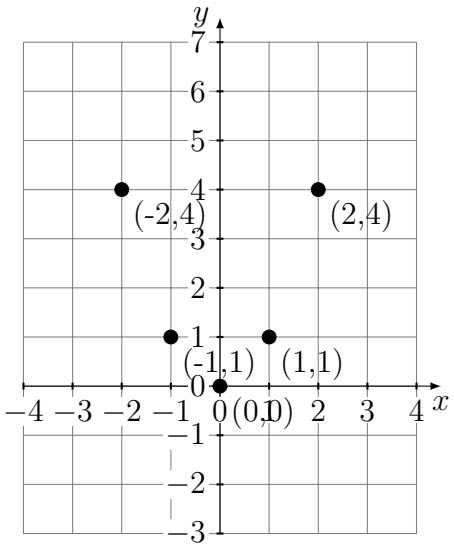
$$y = x \cdot x$$

Our equation has two variables just like before, so let's try choosing values for x.

x	$x \cdot x = y$	(x, y)
-2	$-2(-2) = 4$	(-2, 4)
-1	$-1(-1) = 1$	(-1, 1)
0	$0(0) = 0$	(0, 0)
1	$1(1) = 1$	(1, 1)
2	$2(2) = 4$	(2, 4)

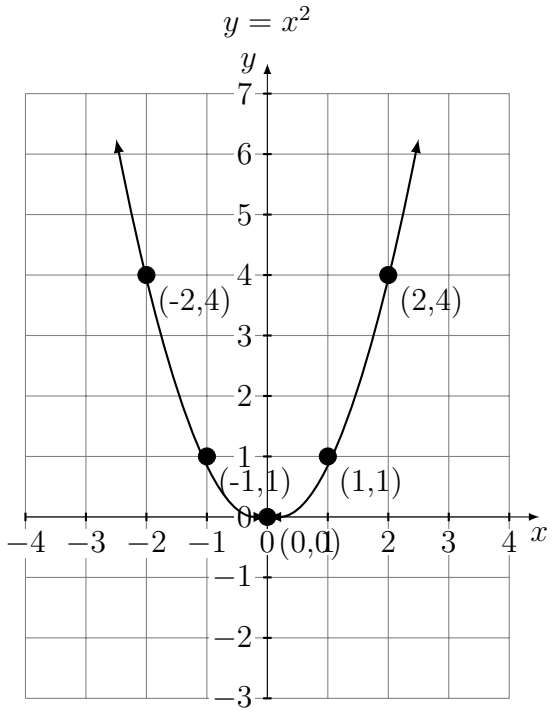
What do you notice about the different values for x versus the different values for y?

This becomes more obvious when we graph the points on the coordinate plane.



Looking at the graph we can see that although our values of x are both positive and negative, all of the y values are positive. Why is this the case? Well consider what happens if we square a number. Any positive number, like 3, will stay positive. $3 \cdot 3 = 9$ If we a square a negative number, then we also get a positive number. Two values for x will give us the same value of y.

When we graph this equation on the coordinate plane it forms a curve called a *parabola*.



In this case, we followed the same steps and ended up with an entirely different type of graph!

3.3 Linear vs. Nonlinear

What makes the two graphs take different shapes? It turns out that the exponent on x will change the shape of the graph. Any equation with x will form a straight line and any equation with x^2 will form a parabola. An equation with x^3 will form a different shape altogether!

Name_____ Date _____

Review – Chapter 11

Watch Thursday's video on Google Classroom

Complete the table.

integer	*opposite*	*absolute value*
-12		
4		
-8		

Write $<$ or $>$ in the blank to make a true statement.

4) -12 _____ -10 5) 4 _____ -8

Find each sum.

6) $-6+13$ 7) $8+(-11)$ 8) $-4+(-4)$

Adding a negative number is the same as _____ a positive number.

Find the difference.

9) $-16-8$ 10) $4-10$ 11) $-16-(-18)$

Subtracting a negative number is the same as _____ a positive number.

Perform the indicated operation.

12) -4×6

13) $10 \times (-10)$

14) $-3 \times (-25)$

15) $-8 \times (-3) \times (-2)$

16) $-57 \div 3$

17) $-108 \div (-12)$

If the number of negative factors is even, the product is _____.

If the number of negative factors is odd, the product is _____.

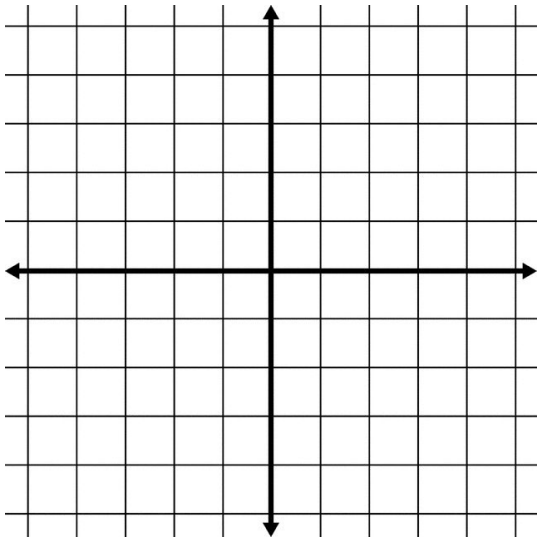
Solve each equation. Show your work!

18) $y + 9 = 4$

19) $x - (-7) = -19$

20) $\frac{1}{-5}n = -4$

Use the grid below for Exercises 21 and 22.



21) Graph and label each ordered pair.
$(-1, 3),\ (-1, 0),\ (2, -2)$

22) Graph $y = 2x - 1$.
Use values of x from -1 to 2.

Define and give an example of the following terms:

Negative number:

opposites:

absolute value:

whole number:

integer:

rational number:

irrational number:

real number:

coordinate plane:

x-axis:

y-axis:

origin:

ordered pair:

coordinates:

function:

Remote Learning Packet

Please submit scans of written work in Google Classroom at the end of the week.

May 4-8, 2020

Course: Physical Education

Teacher(s): John.Bascom@GreatHeartsIrving.org
Joseph.Turner@GreatHeartsIrving.org
James.Bascom@GreatHeartsIrving.org

Weekly Plan:

Monday, May 4
☐ General Mobility Routine

Tuesday, May 5
☐ Workout

Wednesday, May 6
☐ General Mobility Routine

Thursday, May 7
☐ Workout

Friday, May 8
☐ Attend Office Hours (Not mandatory)
☐ General Mobility Routine (Not mandatory)

Statement of Academic Honesty

I affirm that the work completed from the packet is mine and that I completed it independently.

I affirm that, to the best of my knowledge, my child completed this work independently

_____
Student Signature

_____
Parent Signature

Monday, May 4

General Mobility Routine (15-20 minutes)

Complete Part I and record how long it took you. Also, record whether or not you were able to complete all of the exercises. If you had trouble with any specific exercises make note of these. Part II of the workout is not mandatory but is encouraged.

Note: no equipment is required for this workout and only a minimum of space. If space is a challenge make modifications as necessary.

We will have a video uploaded under the Week 6 Topic demonstrating all the exercises for the General Mobility Routine.

PART I:

1. Warmup by running for 2 minutes.
2. Then begin in a resting squat for 30s
3. Bear crawl forwards about 5 feet then straight back.
4. Step back into a pushup position
5. Perform 5 pushups
6. Downdog for 30s
7. Updog for 30s
8. Return to a pushup position
9. Perform 5 pushups

10. Stand up & perform 20 jumping jacks, 10 squats, 10 lunges, and 5 burpees
11. Return to a resting squat for 30 seconds
12. While in resting squat, perform 2 shoulder screws forwards, then 2 backwards, both sides
13. Bear Crawl sideways about 5 feet then return straight back
14. Step back into a pushup position
15. Step your right foot up directly outside your right hand
16. Then reach straight up toward the sky with your right hand & hold for 30s
17. Return to pushup position
18. Step your left foot up directly outside your left hand
19. Then reach straight up toward the sky with your left hand & hold for 30s

20. Return to pushup position
21. 5 pushups
22. Step your feet up to your hands and return to a resting squat
23. Remaining in the squat, grab your left ankle with your right hand and reach straight up toward the sky with your left hand & hold for 30s

24. Remaining in the squat, grab your right ankle with your left hand and reach straight up toward the sky with your right hand & hold for 30s
25. Hands down behind you Crab Walk forwards about 5 feet then straight back
26. Stand up & perform 20 jumping jacks, 10 squats, 10 lunges, and 5 burpees
27. Perform 3 slow Jefferson Curls
28. Rolling Bear Crawl x1 revolution one direction
29. Back Bridge for about 10-15 seconds
30. Rolling Bear Crawl x1 revolution in the opposite direction
31. Find a low hanging branch, pullup bar, ledge, rings, etc. to hang from for as long as you can hold

PART II:

1. Get into a plank
2. Alternate touching opposite elbow and knee for a total of 10 touches
3. Gorilla Hop x2 to the right
4. Gorilla Hop x 2 back to the left
5. Stand and perform 10 steam engine squats (fingers locked behind your head, every time you stand up from a squat touch opposite knee/elbow)
6. Hurdler's walk x6 steps forward
7. Hurdler's walk x6 steps backward
8. Frog Hop x2 forwards
9. Frog Hop x2 backwards

10. Get into a long lunge position
11. Keeping front foot flat on the ground, without touching the back knee to the ground, and trying to keep torso straight up and down slowly lower hips toward the ground. Hold for 15 seconds
12. Switch legs and repeat (hold for 15 seconds)
13. 3 slow Jefferson Curls
14. Rolling Bear Crawl x1 revolution one direction
15. Back Bridge for about 10-15 seconds
16. Rolling Bear Crawl x1 revolution in the opposite direction
17. Find a low hanging branch, pullup bar, ledge, rings, etc. to hang from for as long as you can hold

Tuesday, May 5

Context: Today we're going for a full body strength endurance workout. Try not to take any breaks until you are completely finished.

Setup: You will not need anything except enough space to crawl forwards and backwards.

Warmup: 4 minute light jog

Workout: You are going to repeat a sequence of Pushups, Squats, Bear Crawl/Crab Walk, and Lunges. You will choose a starting number of repetitions and then decrease by one each round until you reach zero. For example: If you choose to start with 10 you will first do 10 pushups, 10 squats, Bear Crawl forward about 6 feet, Crab Walk back about 6 feet, 10 lunges. Then the next round you will do 9 pushups, 9 squats, Bear Crawl forward about 6 feet, Crab Walk back about 6 feet, 9 lunges, etc. The only thing that does not change is the distance that you Bear Crawl/Crab Walk.

Tier 1	10 repetitions for Pushups, Squats, and Lunges	12 foot crawls
Tier 2	8 repetitions	10 foot crawls
Tier 3	6 repetitions	8 foot crawls
Tier 4	4 repetitions	6 foot crawls

Wednesday, May 6

General Mobility Routine

Thursday, May 7

Context: Today's workout will be a very simple but challenging cardio test inspired by last week's workout and designed to imitate the pacer test. We are planning on repeating this workout at least once before the end of the year so it will be helpful to remember exactly how you set up the workout and exactly what your score was.

Setup: You will need two points. We recommend marking a point then walking ten big steps and marking another point. This easy measurement system will allow you to compare future results. If you would like to take this test with other people in your household you should use the same distance between points instead of each of you walking ten big steps.

Warmup: Go back and forth between the two points at a light jog for two minutes. Every time you touch one point do 10 jumping jacks, and at the other do two burpees. Stay relaxed!

Workout: You will be running back and forth between the two points. Count every time you touch a point. At the end of ten minutes record your score. Good luck!

Friday, May 8

Office Hours (Not mandatory)

General Mobility Routine (Not mandatory)

Optional workout #1 :

The workout below is **not** required. You could try to perform it on any day in addition to your daily routine. This workout will most likely take around 30 minutes.
Feel free to modify according to your ability by decreasing or increasing reps or sets. Rests between sets should be between 30s to 1 minute according to fatigue.

Workout:
3 sets of 20 squats
3 sets of 20 lunges
4 sets of 15 pushups
4 sets of 5 burpees
3 sets of 15 crunches
3 sets of 15 leg raises
3 sets of 1 minute high plank (pushup position)
4 sets of 10 jump lunges
4 sets of 10 jump squats

Optional Workout #2:

The workout below is **not** required. You could try to perform it on any day in addition to your daily routine. This workout will most likely take around 45 minutes. Feel free to modify according to your ability by decreasing or increasing the number of sprints and the times for the rest intervals and runs.

1. 5 minute light warmup run
2. 5 minute light warmup stretch
3. Final warmup: perform 3 near springs, 70% max speed, 80% max speed, 90% max speed.
4. Perform eight 50 meter springs with a 30s-60s rest in between. (you want to put a bit of stress on your cardio but make sure that you have recovered enough in order to truly sprint each time)
5. Then perform 10 near springs, between 70-90% with a 10s-20s rest, not long enough to catch your breath fully.
6. Then a 10 minute run at a moderately high speed to complete the cardio workout
7. 5 minutes cool down walk / light jog
8. 5 minutes light stretching.

Optional Workout #3: (10 minutes)

Looking over the week 1 packets I have noticed that a lot of you have made a goal out of improving your resting squat. The following is a short squat mobility routine you might consider adding to your day. First off, an **extremely important point** to greatly increase the success of the mobilizing exercises below: During all these exercises, focus on taking deep, full diaphragmatic breaths (breaths that expand your belly and chest) and long slow exhales (aiming for 6-8 seconds on your exhale).

1st Exercise: split squat : we'll be targeting a single leg in the squat shape.

1. Squat down
2. Keeping your right leg in the squat position, extend your left leg behind you. This leg is not the focus leg, but you do want it facing directly down, with the knee, shin, and top of the foot lying directly down on the ground.
3. For your right leg, make sure you keep the squat position: foot flat on the ground and knee over the ankle or outside (not collapsing in!).
4. You are going to spend 90-120 seconds in this position breathing as stated above and hunting around for tightness by
    a. Driving your pelvis down and your chest up.
    b. Pressing your right knee out as far as you can (with your foot still on the ground)
    c. Dropping down onto your forearms
    d. Twisting and looking to your right
    e. Twisting and looking to your left

Repeat this for the opposite leg

2nd Exercise: hamstring stretch

From a standing position, reach down towards your toes keeping your legs straight (knees locked)
Hold this position for 90-120 seconds as well.
For an added challenge spend some time slowly shifting your weight forwards and backwards in this position. Rock back onto your heels, lifting your toes towards your face as far as possible. Then rock forwards, standing up on your toes as high as possible. Make sure to maintain tension in your hamstring while doing this.

3rd Exercise:

1. From a pushup position, bring your right knee up to your right hand and your right foot up to your left hand. If this position is not possible for you, try to get as close as you can.
2. Keeping your right leg in this position, bring your left leg to the ground facing directly down, with the knee, shin, and top of the foot lying directly down on the ground (same as Exercise 1).
3. Sink your hips down towards the ground:
4. You are going to spend 90-120 seconds in this position breathing as stated above and hunting around for tightness by
    f. Driving your pelvis down and your chest up and back.
    g. Dropping down onto your forearms
    h. Twisting and looking to your right
    i. Twisting and looking to your left

Repeat this for the opposite leg

Remote Learning Packet

Please submit scans of written work in Google Classroom at the end of the week.

May 4-8, 2020

Course: Nature of Science

Teacher(s): Mr. Brandolini (david.brandolini@greatheartsirving.org); Mr. Mooney (sean.mooney@greatheartsirving.org); Mr. Schuler (david.schuler@greatheartsirving.org)

Weekly Plan:

Monday, May 4

☐ Watch the short video on Google Classroom before beginning the week's work
☐ Read Monday's lecture on Antoine Lavoisier and Read *Nature of Science* pp. 121-122
☐ Complete the Reading questions

Tuesday, May 5

☐ Read Tuesday's lecture on Charles' Law & Boyle's Law and pp. 123-124 in *Nature of Science*
☐ Complete the Reading questions

Wednesday, May 6

☐ Read Wednesday's lecture on John Dalton and pp. 125-126 in *Nature of Science*
☐ Complete the Reading questions

Thursday, May 7

☐ Read Thursday's lecture on John Dalton and pp. 126-127 in *Nature of Science* (and also review Dalton's charts on pp. 128-129!)
☐ Complete the Reading questions

Friday, May 8

☐ Attend office hours at 11:30am
☐ Catch-up or review the week's work

Statement of Academic Honesty

I affirm that the work completed from the packet is mine and that I completed it independently.

I affirm that, to the best of my knowledge, my child completed this work independently

_____
Student Signature

_____
Parent Signature

Monday, May 4

1. Watch the introductory video on Google Classroom.
2. Then, read the lecture document below.
3. Next, read pp. 121-122 of *Nature of Science*.
4. Finally, complete the reading questions worksheet for today's readings.

Antoine Lavoisier, *Elements of Chemistry*

Our next scientific thinker is the Frenchman Antoine Lavoisier. His *Elements of Chemistry*, published in France in 1789 and translated into English in 1790, continues to build off of many of the ideas we've seen in previous thinkers. Much like Democritus, Lucretius, and Newton before him, Lavoisier sought to more deeply understand the relationship between particles of bodies, the void between them, and their properties.

Recall that Anaximenes explained all matter and changes in matter as the result of one element, air, subject to two opposites, Rarity and Density. Similarly, Empedocles explained all matter and changes in matter as the result of four elements that are subject to two opposite forces, Love and Strife. Lavoisier continues from this tradition by stating that all matter and changes in matter result from two opposite forces: **Attraction** and **Repulsion**. Through careful observation, he learned that by applying heat to many different materials, he could begin to see that Repulsion, or separation of particles, is caused directly by applying precise amounts of heat to an object.

If every particle is suffering one of these two opposite forces, then how does a solid object even stay together at all? Lavoisier explains that most particles suffer *both*: when the amount of Attraction and Repulsion on a particle is the same, that particle is in a state of balance called **equilibrium**. If enough heat is applied to a body, the Repulsive force becomes stronger than the Attractive one, and the particles will move far enough apart from each other that an object will no longer remain solid.

Lavoisier takes an experimental approach to demonstrating this idea by observing a very common substance: water. He observes that there is a precise, measurable connection between the solid, liquid, and gas (or "elastic aeriform") states of water and the amount of heat present in them: at precisely 0℃ (or, 32℉), water remains solid and is called ice. Above that temperature, Lavoisier says that there is a lack of **reciprocal attraction**, meaning some particles are more attracted than others due to an uneven amount of heat; this causes the liquid state we call water. On the other hand, he noticed that if you *raise* the temperature of water to above 212℉, water boils and becomes vapor, or gas. In either direction, at a precise point, a specific amount of change in the temperature of the substance always results in the same chemical change. Lavoisier then suggests that every kind of substance must have its own specific temperatures at which the substance enters a solid, liquid, or gas state of matter; for example, it just so happens that air's natural state is for the particles to be distant enough that it is a gas. But why is this the case?

Lavoisier attempts to prove this conclusion by inferring that there may be a hypothetical substance that serves as the *cause* of heat itself. (It's important to emphasize that word **hypothetical**: Lavoisier is doing what any good scientist does, which is propose a possible explanation to a difficult question, while remaining open to the idea that his suggestion could be incomplete or incorrect.) He says that this substance would have to be an extremely, microscopically thin fluid that fills in the void between particles and pushes them apart from each other, causing the effect of Repulsion through heat. He gives this fluid three different names: *igneous fluid, matter of heat,* and *caloric*, a word that can generally just mean "something that pertains to heat". This *caloric* would fill up all of the void between particles in order to push them apart: Lavoisier compares this idea to an image of a bowl of lead spheres being filled with sand: the sand would fill up between the lead spheres and begin to push them further away from each other within the bowl.

Lavoisier's hypothesis of the *caloric* fluid has since been disproven, but he himself stated that "we are not obliged to suppose this to be a real substance"; the important thing was that he was able to discover the relationship between a measured amount of heat and the change in a substance's state of matter, which *does* hold up. Just like all of the scientists before him, Lavoisier sought to explain changes in matter as the result of an ultimate material in order to have a concrete explanation of the laws that govern its behavior.

Name:_____
Section & Course: _____
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Date:_____

Week 6, Monday: Lavoisier, *Elements of Chemistry* Reading Questions Worksheet

1. What two Pre-Socratics do Lavoisier's theories most seem to resemble?
   a. Lucretius and Newton
   b. Anaximander and Thales
   c. Heraclitus and Thales
   d. Anaximenes and Empedocles

2. By examining water in different states of matter, Lavoisier infers that the state of matter a substance is in is directly related to the amount of ____.
   a. strife
   b. heat
   c. electricity
   d. water

3. List the three names that Lavoisier gives to the "very subtle fluid" that makes bodies expand:

_____

4. In your own words, try to describe how Lavoisier's *caloric*, or "very subtle fluid", could help explain how particles expand away, or are Repulsed, from each other.

_____

_____

_____

_____

5. Based off of both the lecture and the reading, does **heat** seem to be more of a quality, or a substance? Explain as best as you can in a few sentences.

_____

_____

_____

_____

Tuesday, May 5

Name: _____
Section & Course: _____
Teacher: _____
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Charles and Boyle – "The Gas Laws"

Today, we will be learning about two more scientists, Charles and Boyle, and how they built upon the ideas of Lavoisier. Lavoisier, as you will recall, said that there were three states of matter: solid, liquid, and gas. The two scientists we will study today took a special interest in the last of these—the gas state—and we will soon see what they discovered.

Thinking Like Lavoisier
Let's do a little thought-experiment here. Imagine a clear, see-through balloon, tied up tightly at the top. It is *not* empty—it is full of *gases* (matter in air-like form). Now, I want you to imagine the gas in this balloon exactly how Lavoisier would have imagined it. Can you see it? Zoom in *really* close up—there they are, the tiniest little particles of matter, with plenty of empty space, or void, between them. They are attracted to each other like magnets, but remain at a distance from each other due to the repulsive force of "*caloric"* (that is, the substance of heat).

Alright, are you seeing it? Lots of particles, at a distance from each other in the void, kept at a distance by the caloric that is filling up the void. Okay now, here's the question: *What would happen if you added some caloric?* That is*, what happens if you heat up the balloon?*

Charles' Discovery
This is precisely the question that our next scientist, a Frenchman named Jacques Charles, was keenly interested in. If caloric, thought Mr. Charles, is what is separating the little particles, wouldn't adding more caloric cause them to separate *even more*? And wouldn't that then increase the *volume* (the space it takes up)? If a gas is heated up, the volume should increase.

Mr. Charles had a good hypothesis. But, like a good student of Lavoisier, he did not stop there, but set to work using Lavoisier's methods of experimentation, measurement, and inference. We can imagine Mr. Charles there, with a container full of gas, heating it up little by little, measuring the temperature and the volume each time, and recording all of his measurements on paper. And by the end of it—lo and behold—the volume changed as he added heat to it! Every time he raised the temperature, the volume of the gas increased. It was just as he predicted…

…And then it did *more* than he had predicted. Charles' opened wide in amazement. He double-checked his measurements—he couldn't believe his eyes! When the gas was heated, its volume expanded *in direct proportion to the heat introduced*.

Charles' "Law"
Mr. Charles must have been so surprised when he realized what was happening. The volume and temperature of gases are *directly proportional*. But what does this mean? Yes, it means that as temperature increases or decreases, volume increases or decreases with it. But even more than this, it *increases and decreases in the same ratio*! That is, if you double the temperature, you double the volume; if you triple the temperature, you triple the volume; if you cut the temperature in half, the volume

will be cut in half also. This relationship is perfectly *mathematical,* and can be written as a mathematical statement called a *proportion*:

$$T \text{ varies directly as } V$$

$$\frac{T_1}{T_2} = \frac{V_1}{V_2} \qquad T_1 : T_2 :: V_1 : V_2$$

This proportion has come to be known as "Charles' Law." That's right—it is called a *Law*. I assume you know what a human law is. Well, laws of nature are similar, except that they are not invented by human beings (they are *discovered* by human beings!), and furthermore, nature cannot choose to disobey them—they *always, always, always obey them*. If right now you were to put an air-filled balloon in the freezer, the gases inside would obey Charles' law *exactly*.[1]

Does it surprise you that the law of nature that gases follow is a mathematical statement? Just think about it! It's incredible! *Why do natural things sometimes obey mathematical laws?* Not all laws of nature are mathematical, but some clearly are. What does this mean about the universe we live in? Pythagoras would be jumping up and down with joy if he were here.

Another Question about Gas

Around this same time, there was another natural scientist who was also interested in the behaviors of gases and the ideas of Lavoisier. His name was Mr. Robert Boyle. He saw the importance of Charles' results, and what they meant about the forces of Attraction and Repulsion that Lavoisier had described. By increasing heat, you increase the Repulsive force, causing the gas to expand; by decreasing heat, you decrease the Repulsive force, allowing the force of Attraction to bring the particles closer together.

Robert Boyle wondered if there was another way to affect these forces of Attraction and Repulsion in order to change the distance between these particles (thereby changing the volume of the gas). What if you could *force* the particles closer together? After all, isn't something like that happening when you force more and more air into a bike tire—aren't you packing the air in, tighter and tighter, into a small space?

Volume and Pressure

Boyle hypothesized that you *could* change the volume by forcing it. And then, like a good follower of Lavoisier, he began experimenting and collecting precise and careful measurements.

Boyle found that you could indeed change the volume of a gas simply by forcing it. Imagine a piston, like the one pictured to the right. By pushing down on the piston, you could force the same amount of gas into a smaller space. If you pull the piston up, the gas expands to fill the space.

As you might imagine, the harder you push down, the harder the air is going to "push back." If you have ever pumped up a bike tire or a sports ball, you know that it keeps getting harder and harder to push more air in. This forceful "push-back" of the air is called *pressure*.

[1] If you can, you should try it! Take a balloon full of air and put it in the freezer. Wait some time for the air to get cold, and then look at it. Notice any change? Take it out and warm it up in your hands. What happens?

Boyle's Law

Boyle soon discovered that if he decreased the volume, the pressure increased. And as he increased the volume, the pressure decreased. And, what was more, his careful measurements showed him that these two quantities were *inversely proportional*. Yep, you guessed it—*another mathematical law!*

$$P \text{ varies inversely as } T$$

$$\frac{P_1}{P_2} = \frac{\frac{1}{V_1}}{\frac{1}{V_2}} \qquad\qquad P_1 : P_2 :: \frac{1}{V_1} : \frac{1}{V_2}$$

These are the mathematical ways of expressing that if you double the pressure, you cut the volume in half; if you cut the pressure in half, you double the volume; and so on.[2]

Conclusion

Let's take a moment now to consider what Charles and Boyle had discovered. Well, for one, it means that gases—and perhaps even all matter—obey certain mathematical laws. (Loud cheers from Pythagoras and his followers!).

Secondly, these laws may also confirm Lavoisier's ideas (One loud cheer from Lavoisier!). If Lavoisier is right about matter—if there really are a bunch of little particles in the void, held in a kind of balance between the forces of Attraction and Repulsion—then it would make sense that increasing the force of Repulsion (caloric) would cause the volume to expand. It also makes sense of the fact that you can force the particles closer together, but that the pressure (or "pushback") of the gas would increase as you did so. (If you have ever tried to push two repelling magnets closer together, you know that the closer they get, the stronger the force pushing back. It seems reasonable to say that a similar thing is happening here.)

But still there are many questions left to answer. Most of all, *why the direct and inverse proportionality*? What is causing the changes to be so perfectly balanced and constant? What does this mean about the forces of Attraction and Repulsion? What does this mean about those tiny little particles? What does it mean about the void? Yes, there is certainly much mystery here still, but the discovery of these mathematical laws is an encouragement to keep searching, a promise that there *is* some hidden cause that we might be able to discover if only we persevere.

[2] Notice that in Charles' Law, volume and temperature either both increased or both decreased; here, with Pressure and Volume, **if one goes up, the other goes down**.

Charles and Boyle, "The Gas Laws" - Questions (Tuesday May 5)

1. Charles and Boyle are two scientists who focused their attention on the behavior of __.
    a. Solids
    b. Liquids
    c. Gases

2. To answer the questions they had about gases, they followed Lavoisier's methods of __.
    a. isolate, balance, and check
    b. experimentation, measurement, and inference
    c. stop, drop, and roll

3. Charles' hypothesized that, if heat (caloric) were added to a gas, the gas would __.
    a. remain constant
    b. increase in volume
    c. decrease in volume
    d. explode

4. Charles found that Volume and Temperature were _____ proportional.

5. This meant that, if the temperature of the gas doubled, the volume would _____

6. Charles' Law, written as a mathematical statement, is _____

7. Boyle attempted to change the volume of a gas by changing its __.
    a. weight
    b. mass
    c. equilibrium
    d. pressure

8. Boyle found that, as pressure increased the volume _____. As pressure decreased, the volume _____. The pressure and volume of a gas are _____ proportional.

9. Why were the discoveries of Charles and Boyle important for our understanding of the material world? Explain in 2-3 sentences.
    _____
    _____
    _____
    _____

10. (Optional) Put a balloon in the freezer and observe it to see if it seems to be following the Law! (An empty sealed water bottle will also work.) Which Law would be relevant here?

Wednesday, May 6

Name: _____
Section & Course: _____
Teacher: _____
Date: _____

John Dalton, *A New System of Chemical Philosophy*

Instructions for Today:

1. Read the document below. Then, read Chapter II: "On the Constitution of Bodies" by John Dalton on pp. 125-126 (Stop when you get to Chapter III!). Finally, complete the questions.

When we began our study of chemistry (sadly not in person but via these packets!), we introduced the Pre-Socratics and said they were interested in four big questions:

1. What are the first or ultimate principles of the cosmos? Are they material or of some other kind?

2. How many principles are necessary to explain everything in the cosmos?

3. From what material does everything come?

4. How are generation (coming into being) and destruction (passing out of being) possible? How do we explain the appearance of change in the universe?

Hopefully something you are realizing by now is that **these questions have not gone away as time has progressed**! Newer and modern chemists have – by and large – picked up these same questions in their own time.

The Pre-Socratics continue to impress with their enduring insights about the most important questions into the Material Causes of things.

Over the next two days, we will study the thoughts of a very important modern chemist, **John Dalton**, who was born in Eaglesfield, England in 1766. Pay attention to those English (Newton and Boyle were also English); like the Greeks of ancient times, there have been many important and prominent English chemists in the modern era. There must be something in the water – or tea – over there!

As you read here and in the textbook (pp. 125-126 today and 127-129 tomorrow), pay close attention to how Dalton sounds like some of the Pre-Socratics (specifically, Democritus, Empedocles, and Parmenides), as well as his fellow modern chemists such as Lavoisier, Charles, and Boyle. The great scientific conversation continues!

Let's look again at the first Pre-Socratic question:

1. What are the first or ultimate principles of the cosmos? Are they material or of some other kind?

Here's Dalton's answer:

Dalton says the ultimate principles of the cosmos are material. Bodies are composed (made up) of very small particles called "atoms", the things that are a+tomos (uncuttable). Yes, atoms! John Dalton was the first to use that word again since Democritus. We're very used to hearing that word casually used today, but as people participating in the larger scientific conversation, we need to pay close attention to key words such as **atom**.

Dalton then further describes these atoms by saying **heat** will spread them out and cooling will allow them to draw closer together. He pointed out water as an example. When it gets hot, the atoms separate and eventually you have steam or water vapor, which is a gas. As the gas cools, the atoms come closer together and you have liquid water again.

Now, do you also remember from Monday Lavoisier discussing Attraction and Repulsion? Sounds similar! But wait, there is an even deeper connection. Do you remember from Friday April 17 (Week 3 packet) when you read about a Pre-Socratic who discussed Love and Strife as the forces uniting and separating things? Do you remember who that was? It was Empedocles! Love and Strife – Attraction and Repulsion – it all sounds so similar. Dalton agrees.

So, what is new about what Dalton is saying then? Plenty. Let's take just one new idea for today and save the rest for tomorrow.

Dalton sought to answer a big question – but more fully and in a different way – that Newton also addressed:

Say you have atoms that make up water in Dallas and atoms that make up water in London. Will these atoms be the same thing (water in this case) no matter where we find water?

Dalton answered with a resounding yes. Different scientists talked about how particles may have varied in shape and size; Dalton agrees (as we will see), but he says the same *type* of particle (say hydrogen) will always be the same no matter where you find it. How does he know this? He had some fascinating methods, but let's take a simpler one involving the weight of water. Say you weighed a gallon of water every day for 10 days in Dallas and London. Would it always weigh the same? Yes![3] The reason, Dalton says, is because the atoms making up water are the same throughout the created universe. If you have hydrogen atoms in Greece they will be the same as hydrogen atoms in Hyderabad. If you have gold atoms in a bank in Switzerland, they will be the same as gold atoms in your hand in Irving (lucky you!).

[3] Unless, as we studied in Mass v. Gravity, something else, such as changes in altitude or planet, is affecting the weight

Ultimately, Dalton concludes:

> *All atoms of the same kind of substance are perfectly uniform (the same) in size, shape, and weight*.

This may seem like an unremarkable development to us, but if it does it is only because we are standing on the shoulders of giants like Dalton

We will hear more of his genius tomorrow, but hopefully a few things are standing out:

- Dalton is carrying on the ancient conversation begun by the Pre-Socratics and pondering similar questions, though from a new angle. Indeed, he brought back the term "atom" that had largely been out of use for over 2000 years!
- He is definitely modern like his predecessors: Mr. Lavoisier, Mr. Charles, and Mr. Boyle. We can tell because he is interested in defending his arguments by conducting experiments and taking measurements and generally having experimental results and data to support his claims. As you will see modern natural scientists (right up to the present day) have a strong, strong bias for having "data" and measuring things. This has obvious benefits but also consider: What blind spots that might emerge from this hyper-focus on measurement?
- The final question to continue thinking about is, "How on earth were so many Brits (with some Frenchmen, too) so good at chemistry for so many centuries? 'Blimey, beats me!

John Dalton, *A New System of Chemical Philosophy* - Chapter II Worksheet (Wednesday May 6)

1. Dalton brought back, over 2000 years later, which key word that was used by Democritus?
    a. Indefinite
    b. Ultimate
    c. Atom
    d. Element
    e. None of the Above

2. Dalton's experiments led him to agree with Lavoisier that **heat** is a key factor in causing atoms to draw farther apart from each other. This explains why when we heat water, we get water vapor, which is a gas. Lavoisier referred to his theory as one of "Attraction" and "Repulsion" Both Lavoisier and Dalton sound similar to a natural scientist who came many centuries before them. Which one?

    a. Thales
    b. Anaximenes
    c. Anaximander
    d. Pythagoras
    e. Empedocles
    f. Democritus

3. Which new idea did Dalton introduce - with measurement data to support it?

    a. "New" substances are formed when atoms are rearranged and form new combinations
    b. Atoms of elements such as hydrogen vary depending on the substance they are part of
    c. Heat is what causes atoms to separate and repel from one another
    d. Oxygen atoms (or any atom of the same element) will be the same in weight, size, and shape throughout the entire universe

4. Like Lavoisier and Charles and Boyle, Dalton defended his ideas with… Choose TWO answers

    a. Measurement data
    b. Models of atoms
    c. Experiments
    d. The Pythagorean Theorem
    e. Photographs of moving atoms

5. (a) Explain how Dalton is similar to the Pre-Socratics. (b) Then, explain how he is very much a modern chemist.

    (a)_____
    _____
    _____
    (b) _____
    _____

Thursday, May 7

Name: _____
Section & Course: _____
Teacher: _____
Date: _____

John Dalton, *A New System of Chemical Philosophy*

Instructions for Today:

1. Read the document below. Then, read Chapter III: "On Chemical Synthesis" by John Dalton on pp. 126-127 of the *Nature of Science* textbook. Review the tables on pp. 128-129. Finally, complete the questions.

Yesterday, we learned how Dalton brought back an important word from ancient times: **atom**. We also learned he asked many of the same questions about the reality of the universe as the Pre-Socratics, but that he had a different scientific approach than the ancients. Like his fellow modern counterparts, he also strongly emphasized the use of **experimentation** and **measurement**, as well as **inference/induction** (although induction is not something new to modern science).

But what was new in Dalton's thinking? Yesterday, we noted that he used experimentation to demonstrate that all atoms of the same type (for example, hydrogen) will be the same in weight, size, and shape throughout the entire universe. An atom of hydrogen in Texas will be the same as an atom of hydrogen on the sun.

Today, we are going to take a closer look at his other new insights.

To introduce his next insight, let's recall again an enduring question of natural science: *How do we account for change? Can new things come into being?*

Remember an important point about Dalton: he is interested in **quantity** and measuring things (Can't you see Pythagoras smiling?). From his experiments, he inferred that there are an exact number of atoms in a given object. Say you have some water vapor trapped in a glass. Dalton did not claim to know exactly how many small parts of water there were, but there was a specific number. Also, remember he agreed with Empedocles and Lavoiser that there were forces of Attraction and Repulsion at work that allowed atoms to separate and recombine. What this leads to is that **new atoms are not created; they are simply recombined through processes of what he called chemical "analysis" (the separation of particles) and chemical "synthesis" (the chemical joining of particles).** Dalton said it was the amount of **heat**, which he thought was a kind of fluid (interesting), that was responsible for separation or the lack of it.

Parmenides (and Lucretius and Democritus) would be proud! No new atoms come into being or pass out of being; all change is explained through a recombination of existing matter.

This may not strike us as amazing, but pause and ponder this for a moment. Presumably you have interacted with water today. Think about the water you drank or washed with. Mr. Dalton is claiming that the *specific atoms of* hydrogen and oxygen making up that precise water (and he knew it was hydrogen

and oxygen!) have *always existed* since the dawn of creation and will continue to exist until the end of time. Seasons come and go, empires rise and fall, but the amount of hydrogen we have in the universe will always stay the same; it will only recombine in new ways on and on until the lights on the cosmos go out. Here are Mr. Dalton's actual words on the subject:

"No new creation or destruction of matter is within the reach of chemical agency. We might as well attempt to introduce a new planet into the solar system, or to annihilate one already in existence, as to create or destroy a particle of hydrogen" (Dalton, "On Chemical Synthesis").

Now as we have seen, Mr. Dalton is emphatically *not* the first scientist to make this claim, but he develops the claim by trying to demonstrate it with **experiment, careful measurement, and inference**[4] and by developing our understanding and knowledge of these never-dying, never-being-born atoms. That's our next point.

Before revealing his next insight, it's helpful again to review a big question that has been on our natural scientists' minds across the centuries: *How many ultimate substances are there?*

If you recall, Thales and others said only 1 (Thales said water). Then, there were others like Empedocles who said four (Earth, Air, Fire, Water). Dalton said…

TWENTY![5]

There were names for these different "Elements" as they were called by then and he drew up a "Table of Elements". I bet you've heard of the Periodic Table of Elements (the most recent one is on p. 168 in your textbook; compare with Dalton's on p. 129). Dalton developed an early version of the current one! The elements had names such as Carbon, Soda, Lead, Gold, Mercury, Iron, and Lime. We do need to make one thing clear: Mr. Dalton did *not* discover all these elements nor did he claim to. Then, what did he contribute? Mr. Dalton contributed **measurements** about their properties and a greater understanding of how elements combined with one another (like hydrogen and oxygen → water).

What did Mr. Dalton learn about the elements? He learned their **weights** relative to Hydrogen (which has a weight of "1"; everything is compared to hydrogen). Remember that Dalton came to the conclusion that any element of the same kind (think of each individual atom of silver in the universe), would have the same weight. So, if you found something with a different weight, you found a new element!

Dalton relied on the knowledge gained by other scientists in the area of chemical analysis (separation of particles) and synthesis (recombining of particles) to gain insight on the **weights** of elements *and* the **ratios** that were apparent in how they combined. Hmm… "ratio". That word should remind us of an important Pre-Socratic. It's Pythagoras, who saw unity and harmony in **ratios** over 2000 years before Mr. Dalton and his fancy measuring tools came along. The more things change, the more they stay the same... (wait, can things change? Parmenides! Ah!)

Mr. Dalton saw that atoms of elements come together in fairly predictable ways and follow "general rules" in their different combinations. These rules are listed as bullet points on p. 127 of your textbook.

In order to understand the rest of what Dalton did, it's important to know the term **compound**.

---

[4] When you hear "Inference", think: "Induction"

[5] At least… he thought there could be more he didn't know about.

Compound: A substance formed by two or more elements chemically combined. For example, "water" is a compound of 2 hydrogen atoms and 1 oxygen atom.

Remember, Dalton's big contribution was figuring out the weights of the various elements. Here's how he did it:

Because (1) Dalton had tools that could weigh the compounds and (2) because he figured out the rules on how elements often combined and (3) because he knew which atoms made certain compounds, he realized how much each element weighed compared to hydrogen. Look at his Table of Elements on p. 127. You can see a number next to each element name. Hydrogen has a "1" and Carbon a "5", for example. This means Carbon is five times heavier than Hydrogen.

What is the significance of these discoveries?

This is a reasonable question. The significance of his work is pretty serious. Remember that a fundamental question on scientists' minds is how many ultimate substances there are. Not only was Dalton giving a number and names but he was also giving **quantifiable** details *about* each of those elements. Then, taking things a step further, he figured out **quantifiable** ways in which the various elements interacted. These experiment-based results added to the understanding of the elements *and* **how these elements come together to form new substances**.

Now Dalton did not get everything correct (for example, he thought water was 1 hydrogen atom and 1 oxygen atom), but he made significant advances in our understanding of chemical synthesis. He not only could name elements but talk about the process of their combination and separation.

Remember the phrase: **experimentation** and **measurement**, and **inference/induction**. The first two of these methods are what distinguish these recent scientists, including Dalton, from ancient scientists. But never forget how the ideas of new scientists like Dalton echo so much of what their predecessors from over 2000 years ago said. Democritus introduced the term "atom". Pythagoras recognized the centrality of number and ratio. Aristotle (and others) addressed concerns about change and "new" substances. The modern scientists certainly contribute important new understandings to the fundamental questions about the natural world, but they are also certainly, as Newton readily acknowledged, "standing on the shoulders of giants".

John Dalton, *A New System of Chemical Philosophy* - Chapter III Worksheet (Thursday May 7)

1. John Dalton brought back the word "atom" after over 2000 years. He also used:
    a. _____
    b. _____
    c. _____
2. Chemical **analysis** refers to the _____ of atoms and chemical **synthesis** refers to the _____ of atoms.
    a. creation; destruction b. destruction; creation
    c. separation; joining d. joining; separation
3. Dalton thought new things did not come from nothing; he thought new things were the result of the recombination of already existing atoms.
    a. True b. False
4. Mr. Dalton came to the realization that elements come together in certain _____ to form compounds.
    a. Weights
    b. Heights
    c. Ratios
    d. Sizes
5. Mr. Dalton primarily contributed to our understanding of which aspect of elements?
    a. Quantity b. Shape c. Form d. Final Cause

6. Look at Mr. Dalton's Table of Elements on p. 129. Then, look at the recent Period Table of Elements on p. 168. Write one thing that is the same and one thing that is different about them.

Same	Different

7. A significant contribution of Dalton's was his measurement of the weights of different elements. What does it mean that carbon, according to Dalton, has a weight of 5?
    a. Carbon atoms weigh 5 ounces
    b. Carbon atoms are 5x the length of hydrogen atoms
    c. Carbon atoms are 5x as heavy as hydrogen atoms
    d. Carbon atoms are 5x as heavy as oxygen atoms

Friday, May 8

Stop by Office Hours at 11:30 if you can.

Review your work and/or catch up on anything you have not yet completed.