Christina School District Instructional Board

Grade Level: 10th

Week of April 6th, 2020

	Monday	Tuesday	Wednesday	Thursday	Friday
ELA	In 1-2 paragraphs consider a time when you felt betrayed or that you betrayed another person. What happened and what did you do about it? What causes one person to betray another, is it personal traits, circumstances or opportunity?	Read the *Excerpt from The Tragedy of Julius Caesar: Act I, Scene II, a*s you read annotate for understanding. Mark words or phrases that indicate betrayal, loss of trust or events that led to betrayal.	Answer the text-dependent questions, numbers 1-4.	In a well written multi paragraph response answer the following. How are the details about Cassius' swim with Caesar in lines 97-138 important to the development of the theme in the scene? Cite evidence from the text in your response.	
Math (IM2)	*Trigonometric Methods: Connecting Angle Measures and Linear Measures* Read pages 44-46 (attached). Use the examples as a guide. Complete p. 46-47 #1-4.	Use the examples from pages 44-46 as a guide to complete p. 47 #5-8.	Use the examples from pages 44-46 as a guide to complete p. 47 #9-12..	What statements can you make about the connections between slope angle and slope ratio? Answer these questions as a journal entry. Title this entry "Slope Angles and Slope Ratios" and include today's date. What happens to the slope ratio when the angle increases? Decreases? What happens to the slope ratio when the angle is 0º? 90º? When is a slope ratio	

				more than 1? When is it less than 1?	
Science	**Mitosis (part 1):** Read Article on "Mitosis" (5 pages). Highlight, underline, or annotate for understanding.	**Mitosis (part 2):** **DO:** Draw what happens to the chromosomes during each of the mitosis phases. Title and label your drawing. Write a description summarizing the key events of each stage of mitosis.	**Mitosis (part 3):** **Write:** Explain mitosis. In your explanation include the preparations that take place during interphase and each of the four phases of mitosis (prophase, metaphase, anaphase, and telophase).	**Mitosis (part 4):** Consider a cell that has been genetically modified and has had a gene inserted into one chromosome. Write down in paragraph form what you think will be the probability that a daughter cell will receive an inserted gene from a genetically modified parent cell that undergoes mitosis. Be sure to include information about: chromosomes, parent cell, daughter cell, gene	
Social Studies CIVICS	**Civics 1a – Government:** Complete Activity 1 from the document titled, "Government - Civics 1a"	**Civics 1a – Government:** Complete Activity 2 from the document titled, "Government - Civics 1a"	**Civics 1a – Government:** Complete Activity 3 from the document titled, "Government - Civics 1a"	**Civics 1a – Government:** Complete Activity 4 from the document titled, "Government - Civics 1a"	
Social Studies ECONOMICS	**Economics 1a - Determinants of Supply & Demand:** Complete Activity 1 from the document titled, "Determinants of Supply and Demand"	**Economics 1a - Determinants of Supply & Demand:** Complete Activity 1 from the document titled, "Determinants of Supply and Demand"	**Economics 1a - Determinants of Supply & Demand:** Complete Activity 1 from the document titled, "Determinants of Supply and Demand"	**Economics 1a - Determinants of Supply & Demand:** Complete Activity 1 from the document titled, "Determinants of Supply and Demand"	

Excerpt from The Tragedy of Julius Caesar: Act I, Scene II

By William Shakespeare
1599

> *William Shakespeare (April 26, 1564 – April 23, 1616) was an English poet, playwright, actor, and is widely considered the greatest writer in the English language.* The Tragedy of Julius Caesar *is a historical play based on the scheme to assassinate the Roman dictator, Julius Caesar. Caesar was killed by a group of senators who rebelled against him on March 15 in 44 B.C. In this excerpt from the play, Cassius talks to Brutus about what kind of leader he thinks Caesar is. As you read, take notes on how Cassius describes Caesar and his leadership abilities.*

[1]   *[Flourish. Enter CAESAR [1] ANTONY,[2] for the course; CALPURNIA,[3] PORTIA,[4] DECIUS BRUTUS,[5] CICERO,[6] BRUTUS,[7] CASSIUS,[8] and CASCA;[9] a great crowd following, among them a Soothsayer][10]*

"Jules César, Paris, France" por Grufnik tiene licencia bajo CC BY-NC-ND 2.0

CAESAR:

    Calpurnia!

CASCA:

[5]   Peace, ho! Caesar speaks.

CAESAR:

    Calpurnia!

CALPURNIA:

    Here, my lord.

[10]   **CAESAR:**

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1. Julius Caesar (13 July 100 – 15 March 44 B.C.) is based on the historical figure, a Roman dictator and military leader.
2. Antony is a close friend of Caesar's, sometimes referred to as Antonius
3. Julius Caesar's wife
4. Brutus' wife
5. a Roman politician
6. a Roman senator
7. a high-ranking, popular nobleman.
8. a talented general and someone who has known Caesar for a long time.
9. a Roman senator
10. a fortune teller

Stand you directly in Antonius' way,
When he doth run his course. Antonius!

ANTONY:

Caesar, my lord?

[15] **CAESAR:**

Forget not, in your speed, Antonius,
To touch Calpurnia; for our elders say,
The barren,[11] touched in this holy chase,
Shake off their sterile curse.

[20] **ANTONY:**

I shall remember:
When Caesar says 'do this,' it is perform'd.

CAESAR:

Set on; and leave no ceremony out.

[25] *[Flourish]*[12]

SOOTHSAYER:

Caesar!

CAESAR:

Ha! who calls?

[30] **CASCA:**

Bid every noise be still: peace yet again!

CAESAR:

Who is it in the press[13] that calls on me?
I hear a tongue, shriller than all the music,
[35] Cry 'Caesar!' Speak; Caesar is turn'd to hear.

SOOTHSAYER:

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11.   someone unable to have children
12.   music
13.   crowd

Beware the ides of March.[14]

CAESAR:

What man is that?

[40] **BRUTUS:**

A soothsayer bids you beware the ides of March.

CAESAR:

Set him before me; let me see his face.

CASSIUS:

[45]   Fellow, come from the throng; look upon Caesar.

CAESAR:

What say'st thou to me now? speak once again.

SOOTHSAYER:

Beware the ides of March.

[50] **CAESAR:**

He is a dreamer; let us leave him: pass.

[Sennet. Exeunt all except BRUTUS and CASSIUS]

CASSIUS:

Will you go see the order of the course?

[55] **BRUTUS:**

Not I.

CASSIUS:

I pray you, do.

BRUTUS:

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14.   a day on the Roman calendar that falls on March 15

[60]   I am not gamesome: I do lack some part
         Of that quick spirit that is in Antony.
         Let me not hinder,[15] Cassius, your desires;
         I'll leave you.

     CASSIUS:

[65]   Brutus, I do observe you now of late:
         I have not from your eyes that gentleness
         And show of love as I was wont to have:
         You bear too stubborn and too strange a hand
         Over your friend that loves you.

[70] **BRUTUS:**

         Cassius,
         Be not deceived: if I have veil'd my look,
         I turn the trouble of my countenance[16]
         Merely upon myself. Vexed I am
[75]   Of late with passions of some difference,
         Conceptions only proper to myself,
         Which give some soil perhaps to my behaviors;
         But let not therefore my good friends be grieved--
         Among which number, Cassius, be you one--
[80]   Nor construe any further my neglect,
         Than that poor Brutus, with himself at war,
         Forgets the shows of love to other men.

     CASSIUS:

         Then, Brutus, I have much mistook your passion;
[85]   By means whereof this breast of mine hath buried
         Thoughts of great value, worthy cogitations.[17]
         Tell me, good Brutus, can you see your face?

     BRUTUS:

         No, Cassius; for the eye sees not itself,
[90]   But by reflection, by some other things.

     CASSIUS:

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15. **Hinder** *(verb):* to create difficulties that result in delay
16. a person's face or facial expression
17. thoughts

'Tis just:
And it is very much lamented,[18] Brutus,
That you have no such mirrors as will turn
[95]   Your hidden worthiness into your eye,
That you might see your shadow. I have heard,
Where many of the best respect in Rome,
Except immortal Caesar, speaking of Brutus
And groaning underneath this age's yoke,[19]
[100] Have wish'd that noble Brutus had his eyes.

BRUTUS:

Into what dangers would you lead me, Cassius,
That you would have me seek into myself
For that which is not in me?

[105] **CASSIUS:**

Therefore, good Brutus, be prepared to hear:
And since you know you cannot see yourself
So well as by reflection, I, your glass,
Will modestly discover to yourself
[110] That of yourself which you yet know not of.
And be not jealous[20] on me, gentle Brutus:
Were I a common laugher, or did use
To stale with ordinary oaths my love
To every new protester; if you know
[115] That I do fawn on men and hug them hard
And after scandal them, or if you know
That I profess myself in banqueting
To all the rout, then hold me dangerous.

[Flourish, and shout]

[120] **BRUTUS:**

What means this shouting? I do fear, the people
Choose Caesar for their king.
CASSIUS:

Ay, do you fear it?
[125] Then must I think you would not have it so.

BRUTUS:

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18.   **Lament** *(verb):* to express grief or sorrow
19.   something that is regarded as oppressive or burdensome
20.   suspicious

I would not, Cassius; yet I love him well.
But wherefore do you hold me here so long?
What is it that you would impart to me?
[130] If it be aught toward the general good,
Set honour in one eye and death i' the other,
And I will look on both indifferently,
For let the gods so speed me as I love
The name of honour more than I fear death.

[135] **CASSIUS:**

I know that virtue to be in you, Brutus,
As well as I do know your outward favour.
Well, honour is the subject of my story.
I cannot tell what you and other men
[140]   Think of this life; but, for my single self,
I had as lief not be as live to be
In awe of such a thing as I myself.
I was born free as Caesar; so were you:
We both have fed as well, and we can both
[145]   Endure the winter's cold as well as he:
For once, upon a raw and gusty day,
The troubled Tiber chafing with her shores,
Caesar said to me 'Darest thou, Cassius, now
Leap in with me into this angry flood,
[150]   And swim to yonder point?' Upon the word,
Accoutred[21] as I was, I plunged in
And bade him follow; so indeed he did.
The torrent roar'd, and we did buffet it
With lusty sinews,[22] throwing it aside
[155]   And stemming it with hearts of controversy;[23]
But ere we could arrive the point proposed,
Caesar cried 'Help me, Cassius, or I sink!'
I, as Aeneas,[24] our great ancestor,
Did from the flames of Troy upon his shoulder
[160]   The old Anchises bear, so from the waves of Tiber
Did I the tired Caesar. And this man
Is now become a god, and Cassius is
A wretched[25] creature and must bend his body,
If Caesar carelessly but nod on him.
[165]   He had a fever when he was in Spain,
And when the fit was on him, I did mark
How he did shake: 'tis true, this god did shake;
His coward lips did from their colour fly,
And that same eye whose bend doth awe the world
[170]   Did lose his lustre: I did hear him groan:
Ay, and that tongue of his that bade the Romans
Mark him and write his speeches in their books,
Alas, it cried 'Give me some drink, Titinius,'
As a sick girl. Ye gods, it doth amaze me
[175]   A man of such a feeble temper should
So get the start of the majestic world
And bear the palm[26] alone.

[Shout. Flourish]

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21.   fully clothed
22.   strong arms
23.   competitiveness
24.   a Trojan hero and ancestor of the Romans
25.   **Wretched** *(adjective):* in a very unhappy or unfortunate state
26.   praise or honor

BRUTUS:

[180]   Another general shout!
        I do believe that these applauses are
        For some new honours that are heap'd on Caesar.

CASSIUS:

        Why, man, he doth bestride the narrow world
[185]   Like a Colossus,[27] and we petty men
        Walk under his huge legs and peep about
        To find ourselves dishonourable graves.
        Men at some time are masters of their fates:
        The fault, dear Brutus, is not in our stars,
[190]   But in ourselves, that we are underlings.[28]
        Brutus and Caesar: what should be in that 'Caesar'?
        Why should that name be sounded more than yours?
        Write them together, yours is as fair a name;
        Sound them, it doth become the mouth as well;
[195]   Weigh them, it is as heavy; conjure with 'em,
        Brutus will start a spirit as soon as Caesar.
        Now, in the names of all the gods at once,
        Upon what meat doth this our Caesar feed,
        That he is grown so great? Age, thou art shamed!
[200]   Rome, thou hast lost the breed of noble bloods!
        When went there by an age, since the great flood,
        But it was famed with more than with one man?
        When could they say till now, that talk'd of Rome,
        That her wide walls encompass'd but one man?
[205]   Now is it Rome indeed and room enough,
        When there is in it but one only man.
        O, you and I have heard our fathers say,
        There was a Brutus[29] once that would have brook'd[30]
        The eternal devil to keep his state in Rome
[210]   As easily as a king.

BRUTUS:

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27.   giant
28.   a person of a low status
29.   referring to one of Brutus' ancestors who helped establish the Roman Republic
30.   to tolerate or allow

That you do love me, I am nothing jealous;
What you would work me to, I have some aim:
How I have thought of this and of these times,
[215]   I shall recount hereafter; for this present,
I would not, so with love I might entreat you,
Be any further moved. What you have said
I will consider; what you have to say
I will with patience hear, and find a time
[220]   Both meet to hear and answer such high things.
Till then, my noble friend, chew upon this:
Brutus had rather be a villager
Than to repute[31] himself a son of Rome
Under these hard conditions as this time
[225]   Is like to lay upon us.

CASSIUS:

I am glad that my weak words
Have struck but thus much show of fire from Brutus.

BRUTUS:

[230]   The games are done and Caesar is returning.

CASSIUS:

As they pass by, pluck Casca by the sleeve;
And he will, after his sour[32] fashion, tell you
What hath proceeded worthy note to-day.

[235]   *[Re-enter CAESAR and his Train]*

"The Tragedy of Julius Ceasar" by William Shakespeare (1599) is in the public domain.

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31. to be considered something
32. **Sour** *(adjective):* feeling or expressing resentment or anger

Text-Dependent Questions

Directions: For the following questions, choose the best answer or respond in complete sentences.

1. PART A: Which statement expresses a theme of the scene?
   - A. As a leader, it is impossible to please everyone.
   - B. Even the most noble people can be convinced to do evil.
   - C. People never feel satisfied with the power that they have.
   - D. People will often manipulate others to further their own desires.

2. PART B: Which detail from the text best supports the answer to Part A?
   - A. "Except immortal Caesar, speaking of Brutus / And groaning underneath this age's yoke, / Have wish'd that noble Brutus had his eyes." (Lines 65-67)
   - B. "What means this shouting? I do fear, the people / Choose Caesar for their king." (Lines 84-85)
   - C. "Set honour in one eye and death i' the other, / And I will look on both indifferently" (Lines 93-94)
   - D. "There was a Brutus once that would have brook'd / The eternal devil to keep his state in Rome / As easily as a king." (Lines 166-168)

3. PART A: How does his conversation with Cassius most affect Brutus?
   - A. He considers the idea that Caesar may not be the best leader.
   - B. He decides that Caesar must be removed from power immediately.
   - C. He realizes that Cassius is trying to manipulate him to remove Caesar.
   - D. He realizes how dangerous it is for Caesar to be in power.

4. PART B: Which detail from the text best supports the answer to Part A?
   - A. "Another general shout!/ I do believe that these applauses are/For some new honours that are heap'd on Caesar." (Lines 139-141)
   - B. "That you do love me, I am nothing jealous; / What you would work me to, I have some aim" (Lines 169-170)
   - C. "Brutus had rather be a villager/ Than to repute himself a son of Rome/ Under these hard conditions as this time/ Is like to lay upon us." (Lines 179-182)
   - D. "I am glad that my weak words / Have struck but thus much show of fire from Brutus." (Lines 183-184)

5. How are the details about Cassius' swim with Caesar in lines 97-138 important to the development of the theme in the scene? Cite evidence from the text in your response.

_____

_____

_____

_____

_____

_____

_____

Discussion Questions

Directions: Brainstorm your answers to the following questions in the space provided. Be prepared to share your original ideas in a class discussion.

1. In the play, Brutus, Cassius, and Caesar are supposed to be friends. Are Brutus and Cassius acting like a true friend to Caesar? Do friends always support each other's actions? Describe a time when you disagreed with your friend's actions or choices. How did you handle it?

2. Cassius questions why the people see Caesar as a god and believes Caesar uses this power over others. What other characters in the scene have been corrupted by the influence they have over others? Have there been other leaders in history who were corrupted by power?

Trigonometric Methods – Connecting Angle Measure and Linear Measures

TANGENT – THE SLOPE RATIO (TRIGONOMETRY)   4.1.1 – 4.1.5

In the first section of Chapter 4, students consider different slope triangles for a given line or segment and notice that for each line, the slope remains constant no matter where they draw the slope triangle on that line or how large or small each slope triangle is. All the slope triangles on a given line are similar. These similar slope triangles allow students to write proportions to calculate lengths of sides and angle measures. This constant slope ratio is known as the "**tangent**" (trigonometric) relationship. Using the tangent button on their calculators, students are able to find measurements in application problems.

See the Math Notes boxes in Lessons 4.1.1, 4.1.2, and 4.1.4 for more information about slope angles and the tangent ratio.

Example 1

The line graphed at right passes through the origin. Draw in three different slope triangles for the line. For each triangle, what is the slope ratio, $\frac{\Delta y}{\Delta x}$? What is true about all three ratios?

Note: Δx (delta x) and Δy (delta y) are read "change in x" and "change in y."

A slope triangle is a right triangle that has its hypotenuse on the line that contains it. This means that the two legs of the right triangle are parallel to the axes: one leg runs vertically, the other horizontally. There are infinitely many slope triangles that we can draw, but it is always easiest if we draw triangles that have their vertices on lattice points (that is, their vertices have integer coordinates). The length of the horizontal leg is Δx and the length of the vertical leg is Δy. At right are three possible slope triangles. For the smallest triangle, $\Delta x = 3$ (the length of the horizontal leg), and $\Delta y = 2$ (the length of the vertical leg). For the smallest triangle we have $\frac{\Delta y}{\Delta x} = \frac{2}{3}$.
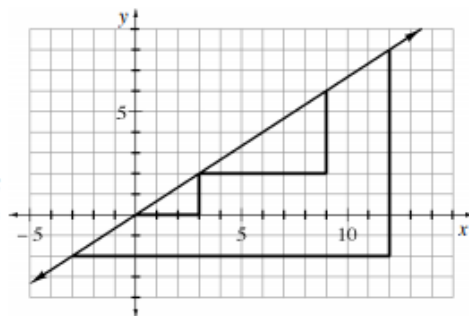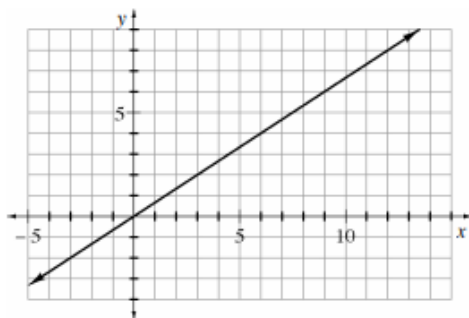
In the medium sized triangle, $\Delta x = 6$ and $\Delta y = 4$, which means $\frac{\Delta y}{\Delta x} = \frac{4}{6}$.

Lastly, the lengths on the largest triangle are $\Delta x = 15$ and $\Delta y = 10$, so $\frac{\Delta y}{\Delta x} = \frac{10}{15}$.

If we reduce the ratios to their lowest terms we find that the slope ratios, no matter where we draw the slope triangles for this line, are all equal.

$$\frac{\Delta y}{\Delta x} = \frac{2}{3} = \frac{4}{6} = \frac{10}{15}$$

                   Core Connections Geometry

Students also discovered that different non-parallel lines do not have the same slope and slope ratio: the steeper the line, the larger the slope ratio, and the flatter the line, the smaller the slope ratio. In Lesson 4.1.2 students connect specific slope ratios to their related angles and record their findings in a Trig Table Toolkit (Lesson 4.1.2 Resource Page). They use this information to find missing side lengths and angle measures of right triangles. At the end of the section students use the tangent button on their calculators to find missing information in right triangles.

Example 2

Write an equation and use the tangent button on your calculator rather than your Trig Table Toolkit, to calculate the missing side length in each triangle.

a.

q

$62°$

9.6

b.

22

$20°$

w
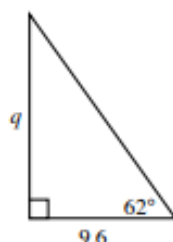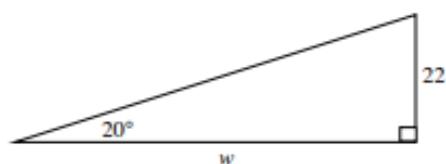
When using the tangent button on a calculator with these problems, you must be sure that the calculator is in degree mode and not radian mode. Student should be able to check this and fix it, if necessary. Since we found that the slope ratio depends on the angle, we can use the angle measure and the tangent button on the calculator to find unknown lengths of the triangle.

In part (a), we know that the tangent of the angle is the ratio $\frac{\text{opposite leg}}{\text{adjacent leg}} = \frac{\Delta y}{\Delta x}$. This allows us to write the equation at right and solve it. Using a calculator, the value of "tan 62°" is ≈ 1.88.

$$\tan 62° = \frac{q}{9.6} \left(\frac{\text{opposite leg}}{\text{adjacent leg}} \right)$$

$$9.6(\tan 62°) = q$$

$$q = (9.6)(1.88) = 18.05$$

In part (b) we will set up another equation similar to the previous one. This equation is slightly different from the one in our first example in that the variable is in the denominator rather than the numerator. Some students might realize that they can rotate the triangle and use the 70° angle (which they would have to determine using the sum of the measures of the angles of the triangle) so that the unknown side length is in the numerator.

$$\tan 20° = \frac{22}{w}$$

$$w \tan 20° = 22$$

$$w = \frac{22}{\tan 20°}$$

$$w = 60.44$$

Example 3

Talula is standing 117 feet from the base of the Washington Monument in Washington, D.C. She uses her clinometer to measure the angle of elevation to the top of the monument to be 78°. If Talula's eye height is 5 feet, 3 inches, what is the height of the Washington Monument?
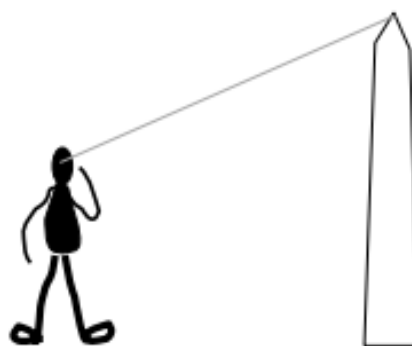
With all problems representing an everyday situation, the first step is the same: draw a picture of what the problem is describing. Here, we have Talula looking up at the top of a monument. We know how far away Talula is standing from the monument, we know her eye height, and we know the angle of elevation of her line of sight.

We translate this information from the picture to a diagram, as shown at right. On this diagram we include all the measurements we know. Then we write an equation using the tangent function and solve for x:
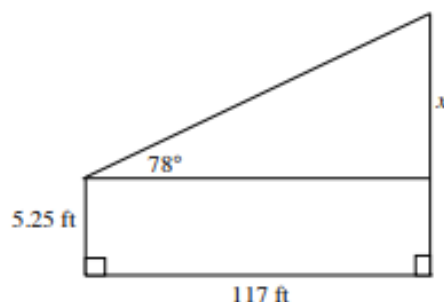
$$\tan 78° = \tfrac{x}{117}$$
$$117(\tan 78°) = x$$
$$x = 549.9 \text{ feet}$$

We add the "eye height" to the value of x to find the height of the Washington Monument:

$$549.9 + 5.25 \approx 555.15 \text{ feet}$$

Problems

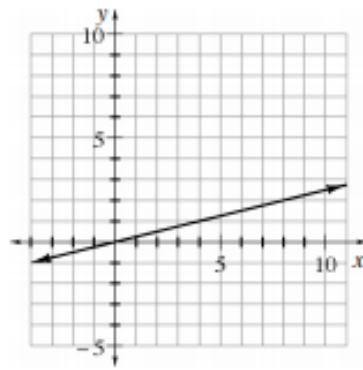For each line, draw in several slope triangles. Then calculate the slope ratios.

1.

2.

           Core Connections Geometry
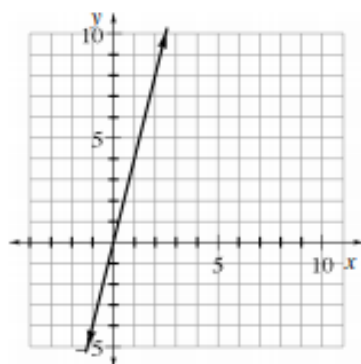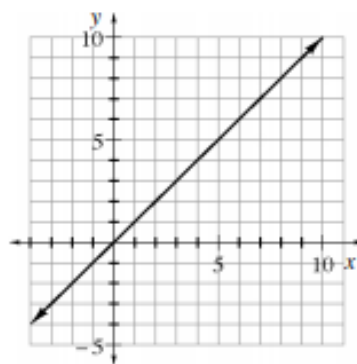
3.
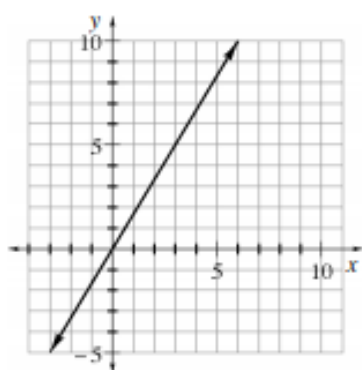
4.
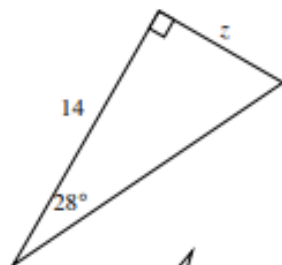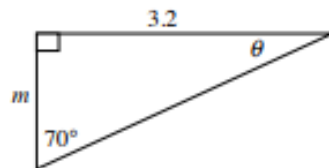

Calculate the measures of the variables. It may be helpful to rotate the triangle so that it resembles a slope triangle. If you write a tangent equation, use the tangent button on your calculator not your Trig Toolkit to solve. Note: Some calculations require the Pythagorean Theorem.
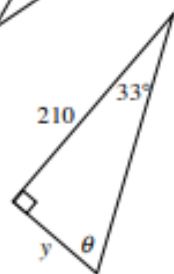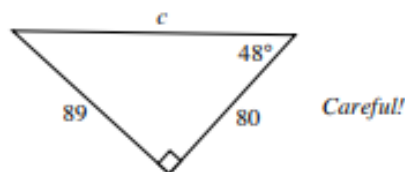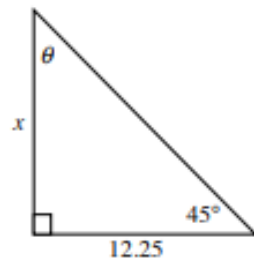
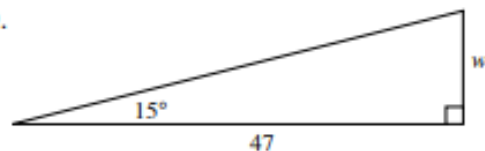**5.**

6.

7.

8.

Careful!

9.

10.

11. A ladder leaning against a wall makes a 75° angle with the ground. The base of the ladder is 5 feet from the wall. How high up the wall does the ladder reach?

12. Davis and Tess are 30 feet apart when Tess lets go of her helium-filled balloon, which rises straight up into the air. (It is a windless day.) After 4 seconds, Davis uses his clinometer to site the angle of elevation to the balloon at 35°. If Davis' eye height is 4 feet, 6 inches, what is the height of the balloon after 4 seconds?

PHASES OF MITOSIS:

Introduction

What do your intestines, the yeast in bread dough, and a developing frog all have in common? Among other things, they all have cells that carry out mitosis, dividing to produce more cells that are genetically identical to themselves.

Why do these very different organisms and tissues all need mitosis? Intestinal cells have to be replaced as they wear out; yeast cells need to reproduce to keep their population growing; and a tadpole must make new cells as it grows bigger and more complex.

What is mitosis?

Mitosis is a type of cell division in which one cell (the **mother**) divides to produce two new cells (the **daughters**) that are genetically identical to itself. In the context of the cell cycle, mitosis is the part of the division process in which the DNA of the cell's nucleus is split into two equal sets of chromosomes.

The great majority of the cell divisions that happen in your body involve mitosis. During development and growth, mitosis populates an organism's body with cells, and throughout an organism's life, it replaces old, worn-out cells with new ones. For single-celled eukaryotes like yeast, mitotic divisions are actually a form of reproduction, adding new individuals to the population.

In all of these cases, the "goal" of mitosis is to make sure that each daughter cell gets a perfect, full set of chromosomes. Cells with too few or too many chromosomes usually don't function well: they may not survive, or they may even cause cancer. So, when cells undergo mitosis, they don't just divide their DNA at random and toss it into piles for the two daughter cells. Instead, they split up their duplicated chromosomes in a carefully organized series of steps.

Phases of mitosis

Mitosis consists of four basic phases: prophase, metaphase, anaphase, and telophase. Some textbooks list five, breaking prophase into an early phase (called prophase) and a late phase (called prometaphase). These phases occur in strict sequential order, and cytokinesis - the process of dividing the cell contents to make two new cells - starts in anaphase or telophase.

Stages of mitosis: prophase, metaphase, anaphase, telophase. Cytokinesis typically overlaps with anaphase and/or telophase.

You can remember the order of the phases with the famous mnemonic: [**P**lease] **P**ee on the **MAT**. But don't get too hung up on names – what's most important to understand is what's happening at each stage, and why it's important for the division of the chromosomes.
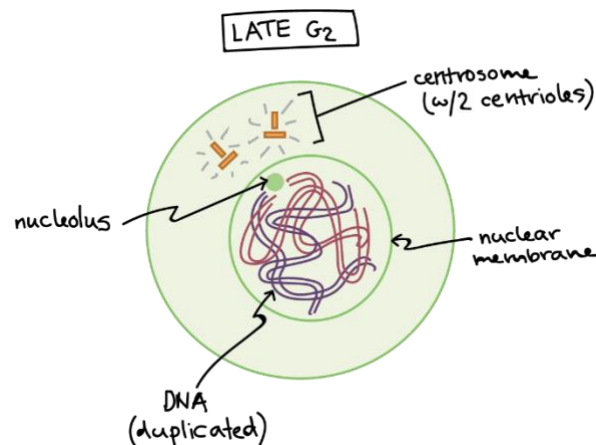
Late G2 phase. The cell has two centrosomes, each with two centrioles, and the DNA has been copied. At this stage, the DNA is surrounded by an intact nuclear membrane, and the nucleolus is present in the nucleus.

Let's start by looking at a cell right before it begins mitosis. This cell is in interphase (late G_2 phase) and has already copied its DNA, so the chromosomes in the nucleus each consist of two connected copies, called **sister chromatids**. You can't see the chromosomes very clearly at this point, because they are still in their long, stringy, decondensed form.

This animal cell has also made a copy of its **centrosome**, an organelle that will play a key role in orchestrating mitosis, so there are two centrosomes. (Plant cells generally don't have centrosomes with centrioles, but have a different type of **microtubule organizing center** that plays a similar role.)
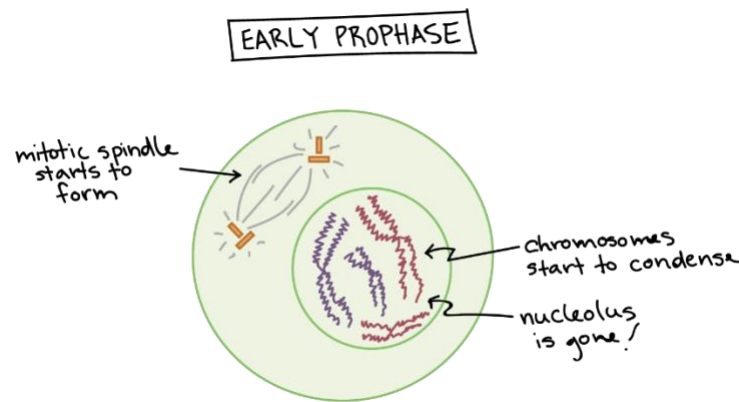
Early prophase. The mitotic spindle starts to form, the chromosomes start to condense, and the nucleolus disappears.

In early **prophase**, the cell starts to break down some structures and build others up, setting the stage for division of the chromosomes.

- The chromosomes start to condense (making them easier to pull apart later on).

- The **mitotic spindle** begins to form. The spindle is a structure made of microtubules, strong fibers that are part of the cell's "skeleton." Its job is to organize the chromosomes and move them around during mitosis. The spindle grows between the centrosomes as they move apart.

- The **nucleolus** (or nucleoli, plural), a part of the nucleus where ribosomes are made, disappears. This is a sign that the nucleus is getting ready to break down.
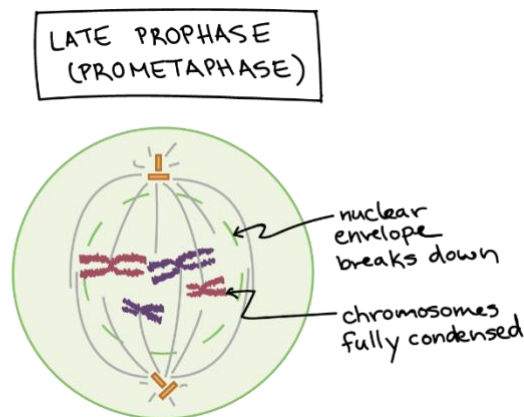

Late prophase (prometaphase). The nuclear envelope breaks down and the chromosomes are fully condensed.

In late prophase (sometimes also called **prometaphase**), the mitotic spindle begins to capture and organize the chromosomes.

- The chromosomes finish condensing, so they are very compact.

- The nuclear envelope breaks down, releasing the chromosomes.

- The mitotic spindle grows more, and some of the microtubules start to "capture" chromosomes.

SPINDLE ANATOMY
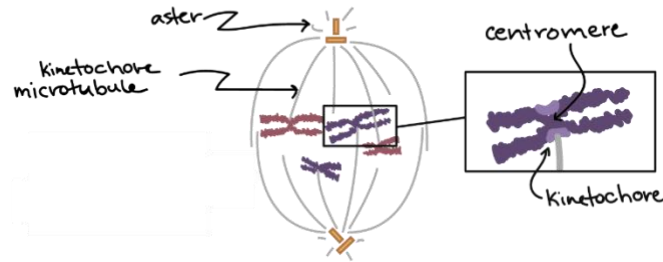
Anatomy of the mitotic spindle. Diagram indicating kinetochore microtubules (bound to kinetochores) and the aster. The aster is an array of microtubules that radiates out from the centrosome towards the cell edge. Diagram also indicates the centromere region of a chromosome, the narrow "waist" where the two sister chromatids are most tightly connected, and the kinetochore, a pad of proteins found at the centromere.

Microtubules can bind to chromosomes at the **kinetochore**, a patch of protein found on the centromere of each sister chromatid. (**Centromeres** are the regions of DNA where the sister chromatids are most tightly connected.)

Microtubules that bind a chromosome are called **kinetochore microtubules**. Microtubules that don't bind to kinetochores can grab on to microtubules from the opposite pole, stabilizing the spindle. More microtubules extend from each centrosome towards the edge of the cell, forming a structure called the **aster**.


METAPHASE
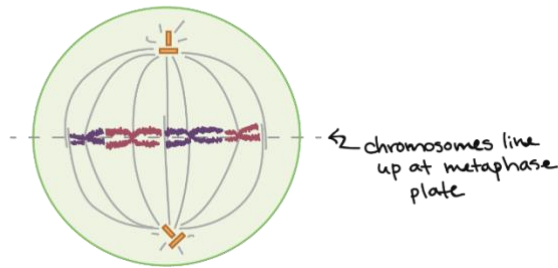
Metaphase. Chromosomes line up at the metaphase plate, under tension from the mitotic spindle. The two sister chromatids of each chromosome are captured by microtubules from opposite spindle poles.

In **metaphase**, the spindle has captured all the chromosomes and lined them up at the middle of the cell, ready to divide.

- All the chromosomes align at the **metaphase plate** (not a physical structure, just a term for the plane where the chromosomes line up).

- At this stage, the two kinetochores of each chromosome should be attached to microtubules from opposite spindle poles.

Before proceeding to anaphase, the cell will check to make sure that all the chromosomes are at the metaphase plate with their kinetochores correctly attached to microtubules. This is called the **spindle checkpoint** and helps ensure that the sister chromatids will split evenly between the two daughter cells when they separate in the next step. If a chromosome is not properly aligned or attached, the cell will halt division until the problem is fixed.
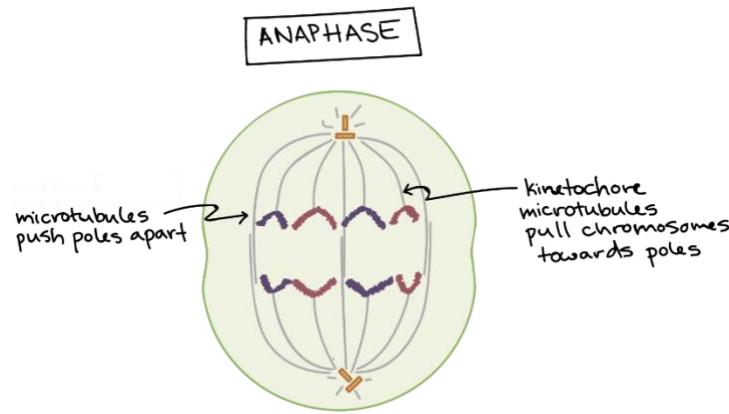
ANAPHASE

Anaphase. The sister chromatids separate from one another and are pulled towards opposite poles of the cell. The microtubules that are not attached to chromosomes push the two poles of the spindle apart, while the kinetochore microtubules pull the chromosomes towards the poles.

In **anaphase**, the sister chromatids separate from each other and are pulled towards opposite ends of the cell.

- The protein "glue" that holds the sister chromatids together is broken down, allowing them to separate. Each is now its own chromosome. The chromosomes of each pair are pulled towards opposite ends of the cell.

- Microtubules not attached to chromosomes elongate and push apart, separating the poles and making the cell longer.

All of these processes are driven by **motor proteins**, molecular machines that can "walk" along microtubule tracks and carry a cargo. In mitosis, motor proteins carry chromosomes or other microtubules as they walk.
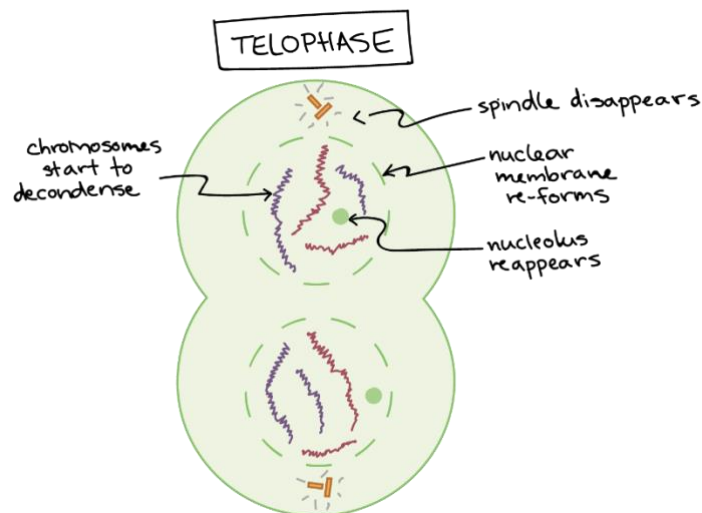
TELOPHASE

Telophase. The spindle disappears, a nuclear membrane re-forms around each set of chromosomes, and a nucleolus reappears in each new nucleus. The chromosomes also start to decondense.

In **telophase**, the cell is nearly done dividing, and it starts to re-establish its normal structures as cytokinesis (division of the cell contents) takes place.

- The mitotic spindle is broken down into its building blocks.

- Two new nuclei form, one for each set of chromosomes. Nuclear membranes and nucleoli reappear.

- The chromosomes begin to decondense and return to their "stringy" form.

Cytokinesis in animal and plant cells.
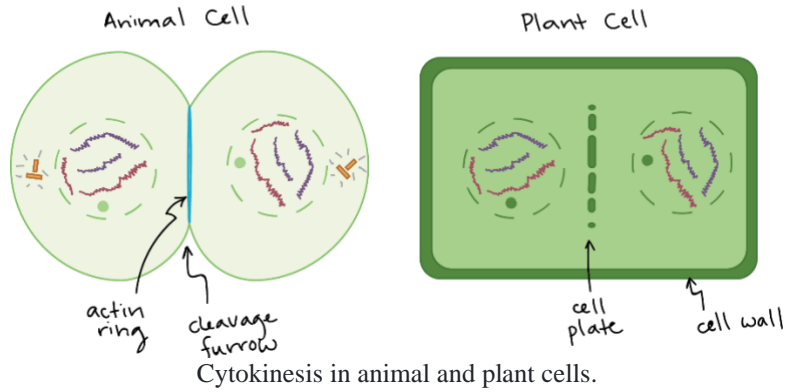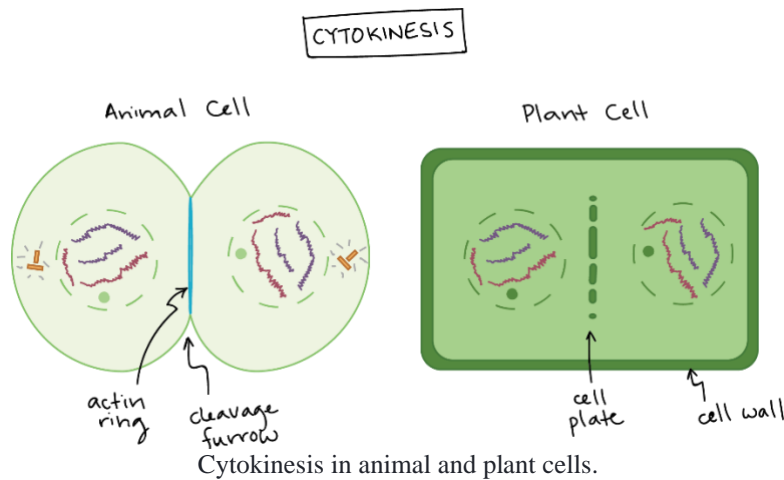
Cytokinesis in an animal cell: an actin ring around the middle of the cell pinches inward, creating an indentation called the cleavage furrow.

Cytokinesis in a plant cell: the cell plate forms down the middle of the cell, creating a new wall that partitions it in two.

Cytokinesis, the division of the cytoplasm to form two new cells, overlaps with the final stages of mitosis. It may start in either anaphase or telophase, depending on the cell, and finishes shortly after telophase.

In animal cells, cytokinesis is contractile, pinching the cell in two like a coin purse with a drawstring. The "drawstring" is a band of filaments made of a protein called actin, and the pinch crease is known as the **cleavage furrow**. Plant cells can't be divided like this because they have a cell wall and are too stiff. Instead, a structure called the **cell plate** forms down the middle of the cell, splitting it into two daughter cells separated by a new wall.
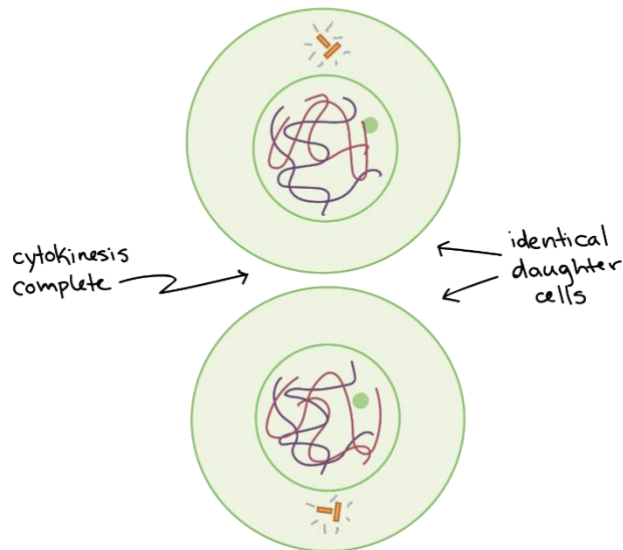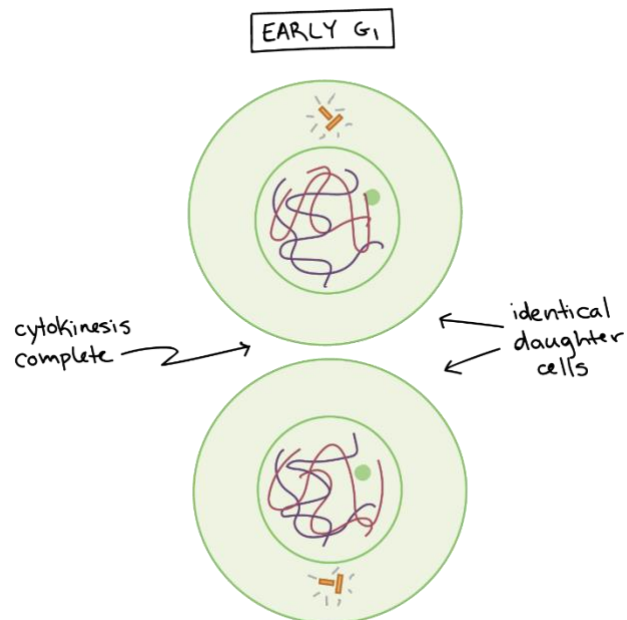
When division is complete, it produces two daughter cells. Each daughter cell has a complete set of chromosomes, identical to that of its sister (and that of the mother cell). The daughter cells enter the cell cycle in G1.

When cytokinesis finishes, we end up with two new cells, each with a complete set of chromosomes identical to those of the mother cell. The daughter cells can now begin their own cellular "lives," and – depending on what they decide to be when they grow up – may undergo mitosis themselves, repeating the cycle.

GOVERNMENT - CIVICS 1A
Social Studies Home Learning Activities

Standard Benchmark Civics 1a	Students will analyze the ways in which the structure and purposes of different governments around the world reflect differing ideologies, cultures, values, and histories.
Grade Band	9-12
Vocabulary/Key Concepts	Structures of Government, Ideologies, Culture, Values

Activity: *Government*

Focus Question: Why might different countries have different structures of government?

Directions:

ACTIVITY 1: Brainstorm different ways that authority or power might flow within a household e.g. Guardian A is in total control and has all authority. Or, Guardians A and B share authority. Or, Guardians A and B as well as the children share authority. Or, the children have all of the authority. List some advantages and disadvantages of each "structure".

Now, substitute country for household and government for guardian. Create an illustration on a piece of paper that shows the different ways that authority or power might flow within different countries that might be similar to, but not the United States.

ACTIVITY 2: Now, draw four columns on a piece of paper and write at the top of…

Column 2: "All power exists in one central government"

Column 3: "All power exists in the state governments"

Column 4: "Power is shared between the national and state governments."

List each of the following in Column 1:
- A pandemic once killed thousands of this country's citizens.
- The most important value shared by citizens of this country is freedom.
- This country was once colonized by a foreign power.
- The citizens of this country strongly believe that everyone should practice the same religion.
- The citizens of this country seceded or broke away because the leader of the country was taking away their property.

Decide which structure of government would be best in each country described in column 1. In columns 2-4, explain why each structure of government would be "good" or "bad" for each country.

ACTIVITY 3**: Draw Your Conclusion:** how does this exercise help illustrate why different countries around the world have different structures of government?

ACTIVITY 4: After reading the article, "Comparing Governments" answer the following questions:
1. Compare the structure and purpose of Japan's government to China's.
2. Based on the structure and purpose of each government, what do you think the ideologies of Japan might be compare to those of China?

COMPARING GOVERNMENTS from https://www.ushistory.org/gov/13a.asp

No two governments, past or present, are exactly the same.

However, it is possible to examine the similarities and differences among political and economic systems and categorize different forms of government. One simple way to categorize governments is to divide them into democratic and authoritarian political systems.

Democracies

Many countries today claim to be democracies, but if the citizens are not involved in government and politics, they are democratic in name only. Some governments are more democratic than others, but systems cannot be considered truly democratic unless the meet certain criteria:

Whither democracy? It was not until 1920 — after decades of tireless protest and campaigning — that women were granted suffrage by the ratification of the 19th Amendment.

- Freedom of speech, the press, and religion. Democracies in general respect these basic individual liberties. No government allows absolute freedom, but democracies do not heavily censor newspapers and public expression of opinions.
- Majority rule with minority rights. In democracies, people usually accept decisions made by the majority of voters in a free election. However, democracies try to avoid the "tyranny of the majority" by providing ways for minorities all kinds to have their voices heard as well.
- Varied personal backgrounds of political leaders. Democracies usually leave room for many different types of citizens to compete for leadership positions. In other words, presidents and legislators do not all come from a few elite families, the same part of the country, or the same social class.
- Free, competitive elections. The presence of elections alone is not enough to call a country a democracy. The elections must be fair and competitive, and the government or political leaders cannot control the results. Voters must have real choices among candidates who run for public office.
- Rule by law. Democracies are not controlled by the whims of a leader, but they are governed by laws that apply to leaders and citizens equally.
- Meaningful political participation by citizens. By itself, a citizen's right to vote is not a good measure of democracy. The government must respond in some way to citizen demands. If they vote, the candidate they choose must actually take office. If they contact government in other ways — writing, protesting, phoning — officials must respond.

The degree to which a government fulfills these criteria is the degree to which it can be considered democratic. Examples of such governments include Great Britain, France, Japan, and the United States.

Authoritarian Regimes

Mao Zedong's position as authoritarian ruler of the People's Republic of China is glorified in this propaganda poster from the Cultural Revolution. The poster reads: "The light of Mao Zedong Thought illuminates the path of the Great Cultural Revolution of the Proletariat."

One ruler or a small group of leaders have the real power in authoritarian political systems. Authoritarian governments may hold elections and they may have contact with their citizens, but citizens do not have any voice in how they are ruled. Their leaders do not give their subjects free choice. Instead, they decide what the people can or cannot have. Citizens, then, are subjects who must obey, and not participants in government decisions. Kings, military leaders, emperors, a small group of aristocrats, dictators, and even presidents or prime ministers may rule authoritarian governments. The leader's title does not automatically indicate a particular type of government.

Authoritarian systems do not allow freedoms of speech, press, and religion, and they do not follow majority rule nor protect minority rights. Their leaders often come from one small group, such as top military officials, or from a small group of aristocratic families. Examples of such regimes include China, Myanmar, Cuba, and Iran.

No nation falls entirely into either category. It also dangerous to categorize a nation simply by the moment in time during which they were examined. The Russia of 1992 was very different from the Russia of 1990. Both democratic and authoritarian governments change over time, rendering the global mosaic uncertain and complex.

Determinants of Supply and Demand

Benchmark Standard:	Economics 1a: Students will demonstrate how economic choices are made in a market economy in which markets and the actions of the government influence the production and distribution of goods and services.
Grade	10
Vocabulary / Key Concepts	See Below in Charts

Activity 1: Read the article "Lesson Summary: Supply and its Determinants" and answer the "Discussion Questions" on a separate sheet of paper.

Lesson summary: Supply and its Determinants

The law of supply

The law of supply states that there is a positive relationship between price and quantity supplied, leading to an upward-sloping supply curve. Sellers like to make money, and higher prices mean more money!

For example, let's say that fishermen notice the price of tuna rising. Because higher prices will make them more money, fishermen spend more time and effort catching tuna. As a result, as the price rises, the quantity of tuna supplied increases.

The determinants of supply

Factors that influence producer supply cause the market supply curve to shift. For example, one of the determinants of supply in the market for tuna is the availability and the price of fishing permits. If more fishing permits are made available and the permit fee is lowered, we can expect more fisherman to enter the market; as a result, the supply of tuna will likely increase. Now, at every price, a greater quantity of tuna will be supplied to the market.

TERM	DEFINITION
supply	a schedule or a curve describing all the possible quantities that sellers are willing and able to produce, at all possible prices they might encounter in a particular period of time; supply is represented in a graphical model as the entire supply curve.
Law of supply	all other factors being equal, there is a direct relationship between a good's price and the quantity supplied; as the price of a good increases, the quantity supplied increases; similarly, as price decreases, the quantity supplied decreases, leading to a supply curve that is always upward sloping.
Quantity supplied	the amount of a good or service that sellers are willing to sell at a specific price; quantity supplied is represented in a graphical model as a single point on a supply curve.
Change in quantity supplied	a movement along a supply curve resulting from a change in a good's price
Change in supply	a movement or shift in an entire supply curve resulting from a change in one of the non-price determinants of supply
Determinants of supply	changes in non-price factors that will cause an entire supply curve to shift (increasing or decreasing market supply); these include 1) the number of sellers in a market, 2) the level of technology used in a good's production, 3) the prices of inputs used to produce a good, 4) the amount of government regulation, subsidies or taxes in a market, 5) the price of other goods sellers could produce, and 6) the expectations among producers of future prices.

Key Graphical Models

The supply curve demonstrates the relationship between a good's price and the quantity producers are willing and able to supply. The upward sloping line demonstrates this direct relationship: as the price rises, the quantity supplied increases; as price decreases, quantity supplied decreases.

Figure 1: An upward sloping supply curve
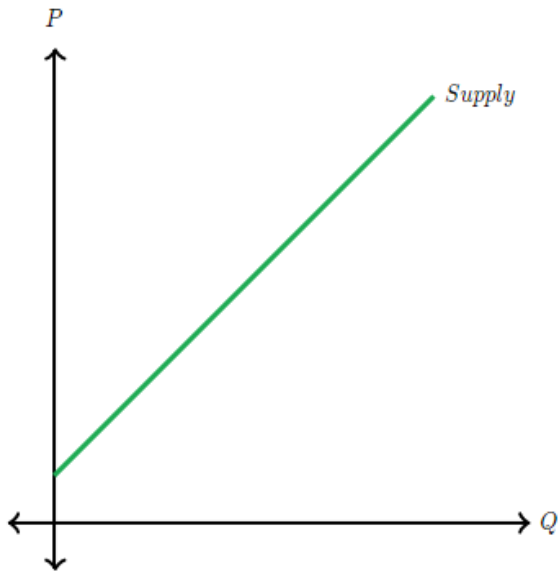
Common Misperceptions

You may often hear people say, incorrectly, that higher prices lead to "more supply" and that lower prices lead to "less supply." However, this is an incorrect use of the terms. Higher prices will result in an increased quantity supplied and lower price will result in a decrease in quantity supplied. Only a change in a non-price determinant of supply causes a good's supply to increase or decrease.

Discussion questions

1. How would producers of a good, such as candy canes, adjust their current supply if they expect its price to rise in the future? [Explain]
2. How will increased regulation of producers by the government affect a good's supply? What other government interferences in a market can influence the level supply of a good? [Explain]
3. In a correctly labelled graph, show an increase in the supply of a good. In another, correctly labelled graph, show an increase in the quantity supplied of a good. Explain why these two are different.

Activity 2: Read the article "Lesson Summary: Demand and the Determinants of Demand" and answer the "Discussion Questions" on a separate sheet of paper.

Lesson Summary: Demand and the Determinants of Demand

In a competitive market, demand for and supply of a good or service determine the equilibrium price.

The law of demand

Markets have two agents: buyers and sellers. Demand represents the buyers in a market. Demand is a description of all quantities of a good or service that a buyer would be willing to purchase at all prices.

According to the law of demand, this relationship is always negative: the response to an increase in price is a decrease in the quantity demanded.

For example, if the price of scented erasers decreases, buyers will respond to the price decrease by increasing the quantity of scented erasers demanded. A market for a good requires demand and supply.

The determinants of demand

What influences demand besides price? Factors like changes in consumer income also cause the market demand to increase or decrease. For example, if the number of buyers in a market decreases, there will be less quantity demanded at every price, which means demand has decreased.

For instance, if scented erasers are normal goods, then when buyers have more income they will buy more scented erasers at every possible price; this would also shift the demand curve to the right.

| Term	Definition
Demand	all of the quantities of a good or service that buyers would be willing and able to buy at all possible prices; demand is represented graphically as the entire demand curve.
Demand schedule	a table describing all of the quantities of a good or service; the demand schedule is the data on price and quantities demanded that can be used to create a demand curve
Demand curve	a graph that plots out the demand schedule, which shows the relationship between price and quantity demanded
Law of demand	all other factors being equal, there is an inverse relationship between a good's price and the quantity consumers demand; in other words, the law of demand is why the demand curve is downward sloping; when price goes down, people respond by buying a larger quantity.
Quantity demanded	the specific amount that buyers are willing to purchase at a given price; each point on a demand curve is associated with a specific quantity demanded.
Change in quantity demanded	a movement along a demand curve caused by a change in price; a change in quantity demanded is a movement along the same curve
Change in demand	when buyers are willing to buy a different quantity at all possible prices, which is represented graphically by a shift of the entire demand curve; this occurs due to a change in one of the determinants of demand.
Determinants of demand	changes in conditions that cause the demand curve to shift; the mnemonic TONIE can help you remember the changes that can shift demand (T-tastes, O-other goods, N-number of buyers, I-income, E-expectations)
Normal good	a good for which demand will increase when buyers' incomes increase.
Inferior good	a good for which demand will decrease when buyers' incomes increase.
Substitute goods	goods that can replace each other; when the price of a good increases, the demand for its substitute will increase.
Complement goods	goods that tend to be consumed together; when the price of a good increases the demand for its complement will decrease.

Key Geographical Models:
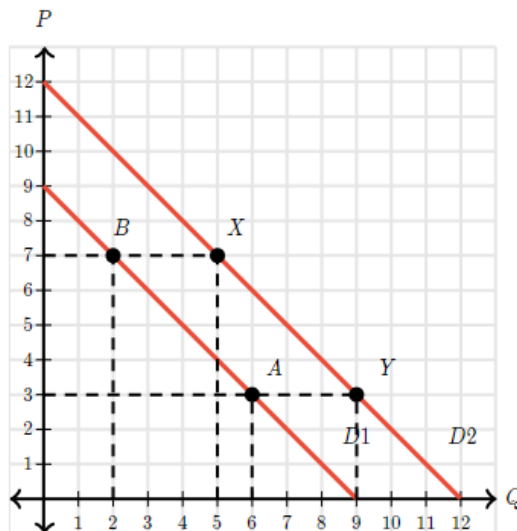
Figure 1: A model showing an increase in demand

The demand curve shows all of the quantities that a buyer is willing to purchase at all possible prices. In Figure 1, the curve D1 represents a buyer that would be willing to nothing when the price is $9, 2 units when the price is $7, 6 units with the price is $3, 9 units if the price was $0.

A movement along a curve, such as moving from point A to point B occurs when price changes, is a response to an increase in price. In this case, this movement is caused by an increase in price from $3 to $7.

The curve D2 represents a higher demand for this good, which would happen if a determinant of demand changed. For example, an increase in the number of buyers of this good would cause the increase in demand shown in this graph. A movement from point B to point X would only occur if demand increased.

Common Misperceptions:

Change in demand vs. change in quantity demanded
- A change in demand and a change in quantity demanded are not the same thing. Demand changes only when one of the determinants of demand change (recall the elements of the mnemonic TONIE). For instance, rising consumer incomes (one of the determinants) will increase demand for new cars, a normal good, which would shift the entire demand curve to the right. More cars will be demanded at every price when demand increases.
- Price is not a determinant of demand, thus a change in price does not cause demand to increase or decrease. If the price of new cars changes, ceteris paribus, there will be a change in the quantity demanded and a movement along the demand curve.

How a price change affects quantity demanded for a good and demand for related goods
- A change in the price of a good will cause the quantity demanded for that good to change, but a change in the demand for related goods (complements and substitutes) causes the demand curve to shift.
- For example, when the price of hot dogs falls three things happen: Quantity demanded for hot dogs increases, demand for hot dog buns (a complement) increases, and demand for hamburgers (a substitute) decreases

Discussion Questions
1. How would you describe to a friend the difference between an increase in demand versus an increase in quantity demanded?
2. What are the five determinants of demand?
3. How would you show a decrease in the demand for Concert Tickets using a graph? [Show how the graph should look]

Activity 3:
The following is a list of 11 determinants of demand and supply. On a separate sheet of paper, label each as either a "Changes in Demand" OR "Changes in Supply"
1. A new football jersey becomes more popular
2. A company has to pay more for their worker's salaries
3. Families move out of the area
4. Nation-wide raises for workers
5. A company finds out they can make more money doing something else
6. New technology comes into the industry
7. Substitute prices
8. Price of the produce increases
9. Complement prices
10. Consumers think something might cost more in the future
11. Major companies go out of business

Activity 4:
1. Draw and label a chart that shows a decrease in supply.
2. Draw and label a chart that shows a decrease in demand.