PHARMACIST EXPLORATION
AND
MEDICATION DOSING ACTIVITY

DISCOVERY:

What does a pharmacist do?
Pharmacists are medication experts and play a critical role in helping people get the best results from their medications. Pharmacists prepare and dispense prescriptions, ensure medicines and doses are correct, prevent harmful drug interactions, and counsel patients on the safe and appropriate use of their medications. They have specialized expertise about the composition of medicines, including their chemical, biological, and physical properties, as well as their preparation and use. They are also key in teaching other healthcare professionals about proper medication therapies.

How to become a pharmacist?
- Earn a Bachelor’s Degree or Complete a Pre-Pharmacy Program
- Obtain a Doctor of Pharmacy Degree
- Acquire a Pharmacist License by passing two national exams, on drug knowledge and laws
- Examine Possible Work Settings – talk to your neighborhood pharmacist

Where do Pharmacists work?

Community pharmacists: work in retail stores such as chain drug stores, grocery stores, large retail stores, or independently owned pharmacies. They dispense medications to patients and answer any questions that patients may have about their prescriptions, over-the-counter medications, or any health concerns that the patient may have. They also may provide some primary care services such as giving immunizations like the flu shot.

Clinical Pharmacists: work in hospitals, clinics, and other healthcare settings. They spend little time dispensing prescriptions. Instead, they are involved in direct patient care. Clinical pharmacists may go on rounds in a hospital with a physician or healthcare team. They recommend medications to give to patients and oversee the dosage and timing of the delivery of those medications. They also may conduct some medical tests and offer advice to patients. For example, pharmacists working in a diabetes clinic may counsel patients on how and when to take medications, suggest healthy food choices, and monitor patients’ blood sugar.
Consultant pharmacists: advise healthcare facilities or insurance providers on patient medication use or improving pharmacy services. They also may give advice directly to patients, such as helping seniors manage their prescriptions.

Pharmaceutical industry pharmacists: work in areas such as marketing, sales, or research and development. They may design or conduct clinical drug trials and help to develop new drugs. They may also help to establish safety regulations and ensure quality control for drugs.

**Salary Range:**

Due to the importance of their position, the vast amount of training and more than 8 years of education required to attain it, pharmacists are well compensated. In 2019, the Bureau of Labor Statistics announced that the average pharmacist earned $128,090 annually.

**BACKGROUND:**

Exposing students to a wide range of career options at a young age helps them make better informed decisions about their career choices. Students are never too young to consider options they might have never heard of!

**SUPPLIES NEEDED:**

All included with this activity

**LESSON CONTENT:**

Students will learn about a career as a pharmacist and participate in a structured activity that might be something a pharmacist would be asked to do on an average day. Use the story provided, along with the chart and medication labels to engage your students in a realistic scenario that uses skills in math, reading, analytical observation and attention to detail.

**KEY TERMS:**

\[ \text{mg} = \text{milligram} \] - A unit of measurement of mass in the metric system equal to a thousandth of a gram (g). A gram is equal to the mass of one milliliter, one thousandth of a liter. The abbreviation for milligram is mg.

\[ \text{mL} = \text{milliliter} \] - A milliliter is a metric unit used to measure capacity that's equal to one-thousandth of a liter. The abbreviation of liter is L. One liter contains 1,000 milliliters, so to convert liters to milliliters you multiply the number of liters times 1,000. The abbreviation of milliliter is mL.

Acetaminophen = Acetaminophen is in many nonprescription and prescription medications and is used to treat minor aches and pains and reduce fever.
Oklahoma Academic Standards

3.N.1 Number and Operations: 3.N.1.1 Read, write, discuss, and represent whole numbers up to 100,000. Representations may include numerals, expressions with operations, words, pictures, number lines, and manipulatives.

3.N.2 Number and Operations: 3.N.2.5 Use addition and subtraction to solve real-world and mathematical problems involving whole numbers. Use various strategies, including the relationship between addition and subtraction, the use of technology, and the context of the problem to assess the reasonableness of results.

3.6.R.2 Reading: Students will use graphic features including photos, illustrations, captions, titles, labels, headings, subheadings, italics, sidebars, charts, graphs, and legends to define a text

3.6.R.4 Reading: Students will determine the relevance and reliability of the information for their specific topic of interest with guidance and support.

4.N.1 Number and Operations: 4.N.1.5 Solve multi-step real-world and mathematical problems requiring the use of addition, subtraction, and multiplication of multi-digit whole numbers. Use various strategies, including the relationship between operations, the use of appropriate technology, and the context of the problem to assess the reasonableness of results.

4.D.1 Data and Probability: 4.D.1.3 Solve one and two step problems using data in whole number, decimal, or fraction form in a frequency table and line plot

4.6.R.2 Reading: Students will use graphic features including photos, illustrations, captions, titles, labels, headings, subheadings, italics, sidebars, charts, graphs, and legends to interpret a text.

4.6.R.3 Reading: Students will determine the relevance and reliability of the information gathered.
ACTIVITY: Did John take too much over the counter medication?

John, a 33-year-old male who is 5’10” and weighs 185 pounds, woke up around 7:30am on Saturday with a serious headache. He took two (2) Tylenol Extra Strength caplets. At 11:45am, still not feeling much better, John decided to take two (2) Tylenol 8HR caplets and lie down for a nap.

He awoke from his nap at 1:30pm and his migraine had turned into a severe cold. He decided to take one (1) packet of Alka-Seltzer to help reduce some of his nasal congestion from the cold.

At 5:45pm, still not feeling like his migraine had subsided he took one (1) more Tylenol Extra Strength caplet.

Around 10:15pm John headed to bed. His symptoms were still the same, but his nose just would not stop running. He knew that NyQuil Severe Cold & Flu would be the best option, especially if he wanted to get any rest. He took two (2) caplets of NyQuil Severe Cold & Flu.

At 3:30am on Sunday, John awoke unrested and feeling as though he had a fever. He rolled out of bed and took one (1) 30 mL capful of a Nighttime Cold and Flu syrup and went back to bed.

John woke up around 7:25am feeling much better but knew that he wanted to stay on top of the strange 24-hour flu-like cold, so he took one (1) Tylenol/8HR caplets and one (1) packet of Atka-Seltzer. It had been a while since he had taken any Tylenol. By lunchtime, John felt like he was back to his old self again.

Answer these questions using the following worksheet:

What is the total dosage that John ingested in 24 hours? ________________

Based on product labels, what is the maximum dosage recommended? __________

How far over did John go on the recommended dosage? __________

Is this a safe amount? __________
WORKSHEET:

Please calculate the amount of acetaminophen that Jonathan took during his 24-hour illness. Is this amount safe using the official ingredients label on each product?

<table>
<thead>
<tr>
<th>Time of Day</th>
<th>Medication Name</th>
<th>Quantity of Caplets, Packets, or Syrup</th>
<th>Acetaminophen Dosage of Each</th>
<th>Acetaminophen mg Ingested</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:30am</td>
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<tr>
<td>11:45am</td>
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<td>1:30pm</td>
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<td>5:45pm</td>
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<td>10:15pm</td>
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<td>3:30pm</td>
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<td>7:25am</td>
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<tr>
<td>7:25am</td>
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</tbody>
</table>

Notes:
# MEDICATION LABELS

## Tylenol Extra Strength

### Drug Facts

**Active ingredient (in each caplet)**  
Acetaminophen 500 mg  
**Purpose**  
Pain reliever/fever reducer

### Uses
- Temporarily relieves minor aches and pains due to:
  - The common cold
  - Headache
  - Backache
  - Minor pain of arthritis
  - Toothache
  - Muscular aches
  - Premenstrual and menstrual cramps
- Temporarily reduces fever

### Warnings
- **Liver warning:** This product contains acetaminophen. Severe liver damage may occur if you take:
  - More than 4,000 mg of acetaminophen in 24 hours
  - With other drugs containing acetaminophen
  - 3 or more alcoholic drinks every day while using this product
- **Allergy alert:** Acetaminophen may cause severe skin reactions. Symptoms may include:
  - Skin reddening
  - Blisters
  - Rash
  - If a skin reaction occurs, stop use and seek medical help right away.

### Do not use
- With any other drug containing acetaminophen (prescription or nonprescription). If you are not sure whether a drug contains acetaminophen, ask a doctor or pharmacist.
- If you are allergic to acetaminophen or any of the inactive ingredients in this product

Ask a doctor before use if you have:
- Liver disease

Ask a doctor or pharmacist before use if you are taking the blood thinning drug warfarin.

Stop use and ask a doctor if:
- Pain gets worse or lasts more than 10 days
- Fever gets worse or lasts more than 3 days
- New symptoms occur
- Redness or swelling is present

These could be signs of a serious condition.

### Drug Facts (continued)

- If pregnant or breast feeding, ask a health professional before use.
- Keep out of reach of children.
- **Overdose warning:** In case of overdose, get medical help or contact a Poison Control Center right away (1-800-222-1222)
- Quick medical attention is critical for adults as well as for children even if you do not notice any signs or symptoms.

### Directions
- Do not take more than directed (see overdose warning)
  - Adults
  - Take 2 caplets every 6 hours while symptoms last
  - Do not take more than 6 caplets in 24 hours.
  - Do not take for more than 10 days unless directed by a doctor
  - Unless directed by a doctor
  - Do not use for more than 10 days unless directed by a doctor
  - Children
  - Ask a doctor
  - Under 12 years

### Other information
- Store between 20-25°C (68-77°F)
- Do not use if carton is opened or neck wrap or foil inner seal imprinted with “TYLENOL” is broken or missing

### Inactive ingredients
- Carnauba wax, com starch, FD&C red no. 40 aluminum lake, hypromellose, magnesium stearate, polyethylene glycol, powdered cellulose, pregelatinized starch, propylene glycol, shellac, sodium starch glycolate, titanium dioxide

*Contains one or more of these ingredients

### Questions or comments?
Call 1-877-895-3665 (toll-free) or 215-273-8755 (collect)
### Tylenol 8-hour

**Drug Facts**

<table>
<thead>
<tr>
<th>Active ingredient (in each caplet)</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetaminophen 650 mg</td>
<td>Painreliever/feverreducer</td>
</tr>
</tbody>
</table>

**Uses**
- Temporarily relieves minor aches and pains due to:
  - Minor pain of arthritis
  - Muscle aches
  - Headache
  - The common cold
  - Toothache

**Warnings**
- Liver warning: This product contains acetaminophen. Severe liver damage may occur if you take:
  - More than 6 caplets in 24 hours, which is the maximum daily amount
  - With other drugs containing acetaminophen
  - 3 or more alcoholic drinks every day while using this product.
- Allergy alert: acetaminophen may cause severe skin reactions. Symptoms may include:
  - Skin reddening
  - Bluish patches
  - Rash
  - Skin reaction occurs, stop use and seek medical help right away.

**Do not use**
- With any other drug containing acetaminophen (prescription or nonprescription) if you are not sure whether a drug contains acetaminophen, ask a doctor or pharmacist.
- If you are allergic to acetaminophen or any of the inactive ingredients in this product.

**Ask a doctor before use if you have liver disease**

**Ask a doctor or pharmacist before use if you are taking the blood thinning drug warfarin**

**Stop use and ask doctor if**
- Pain gets worse or lasts more than 10 days
- Fever gets worse or lasts more than 3 days
- New symptoms occur
- Redness or swelling is present

These could be signs of a serious condition.

**Drug Facts (continued)**

If pregnant or breast-feeding, ask a health professional before use. Keep out of reach of children.

Overdose warning: In case of overdose, get medical help or contact a Poison Control Center right away. (1-800-222-1222)

Quick medical attention is critical for adults as well as for children even if you do not notice any signs or symptoms.

**Directions**
- Do not take more than directed (see overdose warning)

<table>
<thead>
<tr>
<th>Adults</th>
<th></th>
</tr>
</thead>
</table>
|       | Take 2 caplets every 8 hours with water
|       | Swallow whole; do not crush, chew, or split
|       | Do not take more than 6 caplets in 24 hours
|       | Do not use for more than 10 days unless directed by a doctor

<table>
<thead>
<tr>
<th>under 18 years of age</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ask a doctor</td>
<td></td>
</tr>
</tbody>
</table>

**Other information**
- Store between 20°-25°C (68°-77°F)
- Do not use if neck hang imprinted with "Tylenol" or foil inner seal imprinted with "SAFETY SEAL®" is broken or missing

**Inactive ingredients**
- Carnauba wax, hydroxyethyl cellulose, hypromellose, magnesium stearate, microcrystalline cellulose, modified starch, povidone, powdered cellulose, pregelatinized starch, sodium starch glycolate, titanium dioxide, violalin

**Questions or comments?**
- Call 1-877-895-5665 (toll-free) or 215-273-8755 (collect)

© Johnson & Johnson Consumer Inc. 2018
**Drug Facts**

<table>
<thead>
<tr>
<th>Active ingredients (in each tablet)</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anhydrous citric acid 1000 mg</td>
<td>Antacid</td>
</tr>
<tr>
<td>Sodium bicarbonate (heat-treated) 1940 mg</td>
<td>Antacid</td>
</tr>
</tbody>
</table>

**Uses** for the relief of
- heartburn
- acid indigestion
- upset stomach associated with these symptoms

**Warnings**
- Do not use if you have ever had an allergic reaction to this product or any of its ingredients.
- Ask a doctor before use if you have a sodium-restricted diet.
- Ask a doctor or pharmacist before use if you are presently taking a prescription drug. Antacids may interact with certain prescription drugs.
- When using this product do not exceed recommended dosage.
- Stop use and ask a doctor if you have taken the maximum dose for 2 weeks.
- If pregnant or breast-feeding, ask a health professional before use. Keep out of reach of children.

**Directions**
- Fully dissolve 2 tablets in 4 ounces of water before taking.

<table>
<thead>
<tr>
<th>Adults and children 12 years and over</th>
<th>2 tablets every 4 hours as needed, or as directed by a doctor</th>
<th>Do not exceed 8 tablets in 24 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adults 60 years and over</td>
<td>2 tablets every 4 hours as needed, or as directed by a doctor</td>
<td>Do not exceed 4 tablets in 24 hours</td>
</tr>
<tr>
<td>Children under 12 years</td>
<td>Consult a doctor</td>
<td></td>
</tr>
</tbody>
</table>

**Other information**
- Each tablet contains: sodium 575 mg
- Phenylketonurics: contains phenylalanine 5.6 mg per tablet
- Store at room temperature. Avoid excessive heat.
- Alka-Seltzer Heartburn in water contains the antacid sodium citrate as the principal active ingredient.

**Inactive ingredients**
- Acesulfame potassium, aspartame, flavors, magnesium stearate, mannitol

**Questions or comments?** 1-800-986-0369 (Mon – Fri 9AM – 5PM EST)
### NyQuil Severe Cold & Flu Caplets

#### Drug Facts

<table>
<thead>
<tr>
<th>Active ingredients (in each LiquiCap)</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetaminophen 325 mg</td>
<td>Pain reliever</td>
</tr>
<tr>
<td>Dextromethorphan HCl 15 mg</td>
<td>Cough suppressant</td>
</tr>
<tr>
<td>Dihydrocodeine Bitartrate 5.29 mg</td>
<td></td>
</tr>
<tr>
<td>Diphenhydramine Hydrochloride 25 mg</td>
<td></td>
</tr>
</tbody>
</table>

#### Uses
- temporarily relieves common cold/flu symptoms:
  - cough due to minor throat and bronchial irritation
  - sore throat
  - headache
  - minor aches and pains
  - fever
  - runny nose and sneezing

#### Warnings
- Liver warning: this product contains acetaminophen.
- Severe liver damage may occur if you take:
  - more than 4 doses in 24 hrs, which is the maximum daily amount for this product
  - with other drugs containing acetaminophen
  - 3 or more alcoholic drinks daily while using this product
- Allergy Alert: acetaminophen may cause severe skin reactions. Symptoms may include:
  - skin reddening
  - blisters
  - rash
- If a skin reaction occurs, stop use and seek medical help right away

#### Sore throat warning:
- If sore throat is severe, lasts for more than 2 days, is accompanied or followed by fever, headache, rash, nausea, or vomiting, consult a doctor promptly.

#### Do not use:
- with any other drug containing acetaminophen (prescription or nonprescription)
- if you are not sure whether a drug contains acetaminophen, ask a doctor or pharmacist
- if you are taking a prescription monoamine oxidase inhibitor (MAOI) (certain drugs for depression, psychiatric or emotional conditions, or Parkinson's disease), or for 2 weeks after stopping the MAOI drug. If you do not know if your prescription drug contains an MAOI, ask a doctor or pharmacist before taking this product.

#### Ask a doctor or pharmacist before use if you have:
- liver disease
- glaucoma
- cough that occurs with too much phlegm (mucus)
- a breathing problem or chronic cough that lasts or as occurs with smoking, asthma, chronic bronchitis or emphysema
- trouble urinating due to enlarged prostate gland

#### Ask a doctor or pharmacist before use if you are:
- taking sedatives or tranquilizers
- taking the blood thinning drug warfarin

#### When using this product:
- irritability may occur, especially in children
- marked drowsiness may occur
- avoid alcoholic drinks
- be careful when driving a motor vehicle or operating machinery
- alcoholic beverages may increase drowsiness

#### Stop use and ask a doctor if:
- pain or cough gets worse or lasts more than 7 days
- fever gets worse or lasts more than 3 days
- nausea or vomiting is present
- new symptoms occur
- cough comes back or occurs with rash or headache that lasts.

#### These could be signs of a serious condition.

#### If pregnant or breast-feeding, ask a health professional before use.

#### Keep out of reach of children. In case of overdose, get medical help or contact a Poison Control Center right away. Quick medical attention is critical for adults as well as for children even if you do not notice any signs or symptoms.
# Answer Key

*Note that students must read the labels to discover that 30mL of Target Nighttime Cold and Flu is equivalent to 650mg

<table>
<thead>
<tr>
<th>Time of Day</th>
<th>Medication Name</th>
<th>Quantity of Caplets, Packets, or Syrup</th>
<th>Acetaminophen Dosage of Each</th>
<th>Acetaminophen mg Ingested</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:30am</td>
<td>Tylenol Extra Strength</td>
<td>2</td>
<td>500 mg</td>
<td>1,000 mg</td>
</tr>
<tr>
<td>11:45am</td>
<td>Tylenol 8HR</td>
<td>2</td>
<td>650 mg</td>
<td>1,300 mg</td>
</tr>
<tr>
<td>1:30pm</td>
<td>Alka-Seltzer</td>
<td>1</td>
<td>0 mg</td>
<td>0 mg</td>
</tr>
<tr>
<td>5:45pm</td>
<td>Tylenol Extra Strength</td>
<td>1</td>
<td>500 mg</td>
<td>500 mg</td>
</tr>
<tr>
<td>10:15pm</td>
<td>NyQuil Severe cold &amp; Flu Caplets</td>
<td>2</td>
<td>325 mg</td>
<td>650 mg</td>
</tr>
<tr>
<td>3:30pm</td>
<td>Target Nighttime Cold and Flu</td>
<td>1</td>
<td><em>30 mL</em></td>
<td><em>650 mg</em></td>
</tr>
<tr>
<td>7:25am</td>
<td>Tylenol 8HR</td>
<td>1</td>
<td>650 mg</td>
<td></td>
</tr>
<tr>
<td>7:25am</td>
<td>Alka Seltzer</td>
<td>1</td>
<td>0 mg</td>
<td>0 mg</td>
</tr>
</tbody>
</table>

**Notes:**

What is the total dosage that John ingested in 24 hours? 4,750 mg

Based on product labels, what is the maximum dosage recommended? 4,000 mg

How far over did John go on the recommended dosage? 750 mg

Is this a safe amount? No