

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?

Resource: Bureau of Labor Statistics - <https://www.bls.gov/ooh/healthcare/pharmacists.htm#tab-2>

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:

Mg = 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.

mL = 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 lunch time, 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?

Time of Day	Medication Name	Quantity of Caplets, Packets, or Syrup	Acetaminophen Dosage of Each	Acetaminophen mg Ingested
7:30am				
11:45am				
1:30pm				
5:45pm				
10:15pm				
3:30pm				
7:25am				
7:25am				
Notes:				



MEDICATION LABELS

Tylenol Extra Strength

Drug Facts

Active ingredient (in each caplet) Purpose

Acetaminophen 500 mg.....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 and children 12 years and over	<ul style="list-style-type: none"> ■ take 2 caplets every 6 hours while symptoms last ■ do not take more than 6 caplets in 24 hours, unless directed by a doctor ■ do not use for more than 10 days unless directed by a doctor
children under 12 years	ask a doctor

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*, corn 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

Active ingredient (in each caplet)	Purpose
Acetaminophen 650 mg	Pain reliever/fever reducer

Uses

- temporarily relieves minor aches and pains due to:
 - minor pain of arthritis
 - muscular aches
 - backache
 - premenstrual and menstrual cramps
 - the common cold
 - headache
 - toothache
- temporarily reduces fever

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, 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	<ul style="list-style-type: none"> take 2 caplets every 8 hours with water swallow whole; do not crush, chew, split or dissolve do not take more than 6 caplets in 24 hours do not use for more than 10 days unless directed by a doctor
under 18 years of age	ask a doctor

Other information

- store between 20-25°C (68-77°F)
- do not use if neck band 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, triacetin

Questions or comments?

call 1-877-895-3665 (toll-free) or 215-273-8755 (collect)

TYLENOL

For what matters most™

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OKLAHOMA STATE UNIVERSITY
MEDICINE

Alka-Seltzer

Drug Facts

Active ingredients (in each tablet)

Purpose

Anhydrous citric acid 1000 mgAntacid
Sodium bicarbonate (heat-treated) 1940 mgAntacid

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

adults and children 12 years and over	2 tablets every 4 hours as needed, or as directed by a doctor	do not exceed 8 tablets in 24 hours
adults 60 years and over	2 tablets every 4 hours as needed, or as directed by a doctor	do not exceed 4 tablets in 24 hours
children under 12 years	consult a doctor	

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

Active Ingredients (in each LiquiCap)	Purpose
Acetaminophen 325 mg	Pain reliever/Fever reducer
Dextromethorphan HBr 15 mg	Cough suppressant
Doxylamine succinate 6.25 mg	Antihistamine

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 now 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 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

- excitability may occur, especially in children
- marked drowsiness may occur
- avoid alcoholic drinks
- be careful when driving a motor vehicle or operating machinery
- alcohol, sedatives, & tranquilizers 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
- redness or swelling 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.



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Target Nighttime Cold and Flu

Drug Facts (continued)

- be careful when driving a motor vehicle or operating machinery
- alcohol, sedatives, and tranquilizers may increase drowsiness
- avoid alcoholic drinks

Stop use and ask a doctor if:

- redness or swelling is present
- pain or cough gets worse or lasts more than 7 days
- fever gets worse or lasts more than 3 days
- 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.** **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 ■ take only as directed - see Overdose warning

■ use dose cup	■ do not exceed 4 doses per 24 hrs
adults & children 12 yrs & over	30 mL every 6 hrs
children 4 to under 12 yrs	ask a doctor
children under 4 yrs	do not use

Other information ■ each 30 mL contains sodium 38 mg

■ store at 20-25°C (68-77°F)

Inactive ingredients alcohol, anhydrous citric acid, D&C yellow no. 10, FD&C green no. 3, FD&C yellow no. 6, flavor, high fructose corn syrup, polyethylene glycol, propylene glycol, purified water, saccharin sodium, sodium citrate

Questions? Call 1-888-547-7400

*This product is not manufactured or distributed by Procter & Gamble, distributor of Vicks® NyQuil® Cold & Flu.

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NDC 11673-500-40

Compare to active ingredients in
Vicks® NyQuil® Cold & Flu*

nighttime cold and flu

nighttime relief

acetaminophen
(pain reliever/fever reducer)
dextromethorphan HBr
(cough suppressant)
doxylamine succinate
(antihistamine)

aches, fever, sore throat
sneezing, runny nose, cough
ALCOHOL 10%



12 FL OZ (355 mL)

Drug Facts DO NOT USE IF PRINTED NECKBAND IS BROKEN OR MISSING

Active Ingredients (in each 30 mL)

Acetaminophen 650 mg	Pain reliever/fever reducer
Dextromethorphan HBr 30 mg	Cough suppressant
Doxylamine succinate 12.5 mg	Antihistamine

Uses temporarily relieves common cold/flu symptoms:

- fever
- sore throat
- minor aches and pains
- runny nose and sneezing
- headache

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 redness ■ blisters ■ rash

If a skin reaction occurs, stop use and seek medical help right away.

Sore throat warning: If sore throat is severe, persists 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 now 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. ■ if you have ever had an allergic reaction to this product or any of its ingredients

Ask a doctor before use if you have ■ liver disease ■ glaucoma ■ cough that occurs with too much phlegm (mucus) ■ a breathing problem such as emphysema or chronic bronchitis ■ trouble urinating due to an enlarged prostate gland ■ persistent or chronic cough as occurs with smoking, asthma, or emphysema ■ a sodium-restricted diet

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

When using this product

- excitability may occur, especially in children
- marked drowsiness may occur

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OKLAHOMA STATE UNIVERSITY
MEDICINE

ANSWER KEY

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

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

