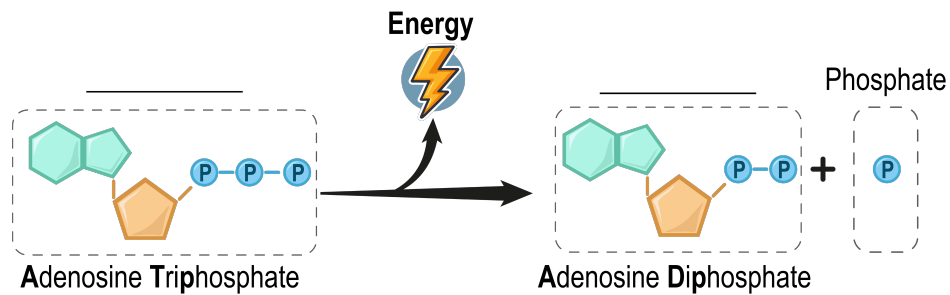


TOPIC: USING ENERGY TO FUEL EXERCISE

Using Energy to Fuel Exercise

- ◆ To perform physical activity, our cells need to generate usable *energy* & _____ is the most common form!
 - **Adenosine Triphosphate (ATP)**: adenosine molecule attached to a chain of _____ phosphate groups.
 - Cleaving a phosphate group from ATP produces ADP, P_i , & releases usable _____!
- ◆ Different exercises rely on different ATP-generating energy systems that differ in ATP production rate & output.



ATP-Generating Energy Systems

- ◆ There are 3 ATP-generating energy systems:

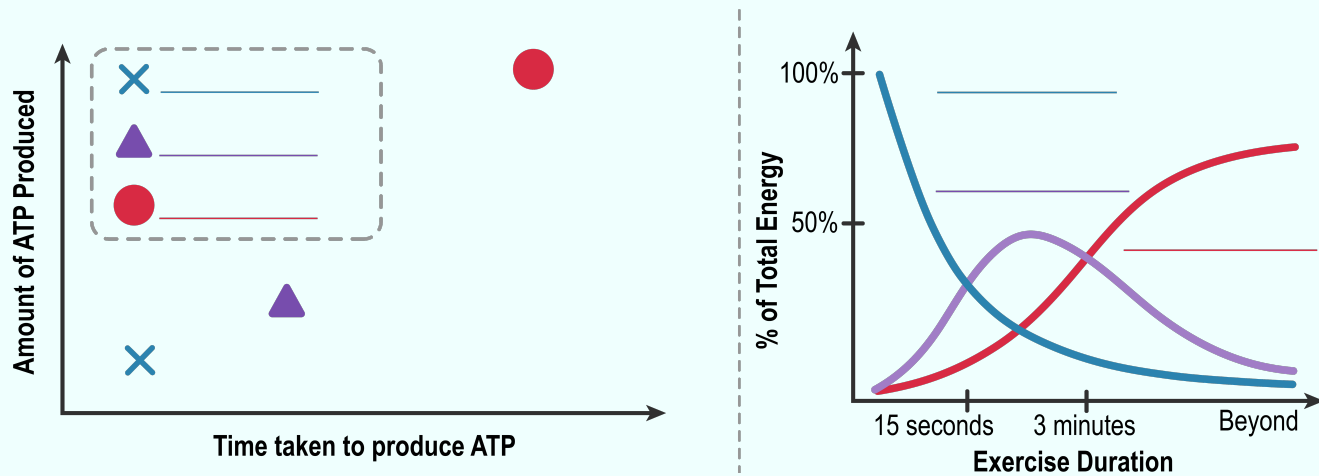
	Anaerobic (Without O_2)		3) Aerobic (with O_2)
	1) ATP-CP	2) Glycolysis	
Speed of ATP Production	_____	Fast	_____
Amount of ATP Produced	_____ amount	Little	_____
When is it the Primary Energy Source?	First ~ _____ seconds of activity	Between ~15 seconds & 3 minutes.	> _____ minutes. Fats: _____ intensity; Carbs: _____ intensity.

Note: Most physical activity is fueled by a combination of aerobic & anaerobic energy.

TOPIC: USING ENERGY TO FUEL EXERCISE

EXAMPLE

Label each color-coded point/curve in the following two graphs with the ATP-generating energy systems.



PRACTICE

Sophie is running a 1500-meter race at a track meet. Which of the following energy systems is she using at each of the following sections of the race?

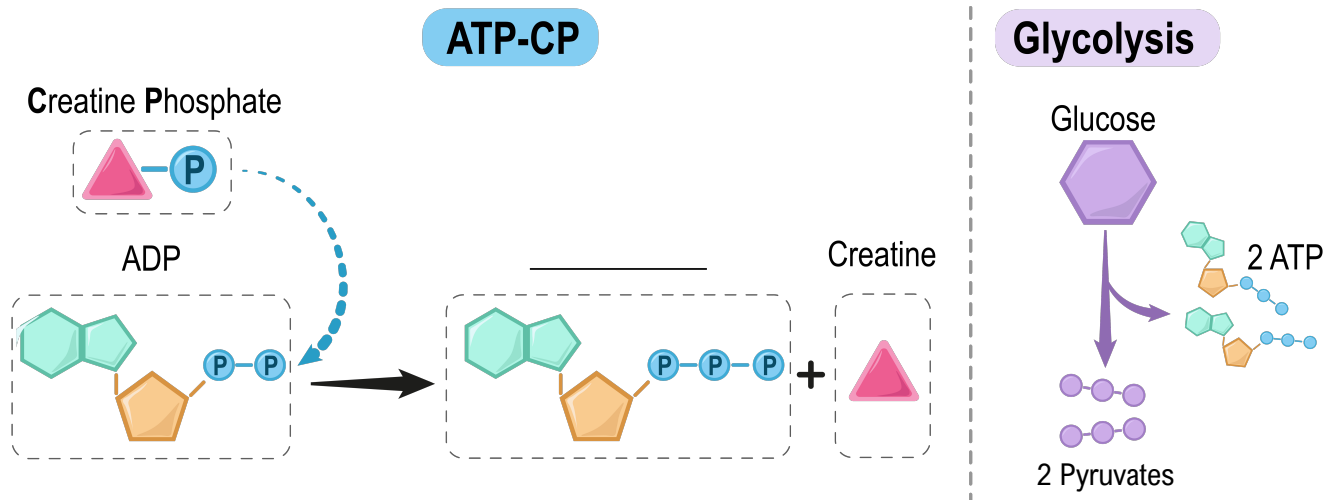
0-100 meters (0-15 seconds) / 100-1000 meters (15 secs – 3 mins) / 1000-1500 meters (3 mins – end of race).

- a) 0-100m: ATP-CP System
100m-1000m: Aerobic system
1000m-1500m: Glycolysis
- b) 0-100m: Aerobic system
100m-1000m: ATP-CP System
1000m-1500m: Glycolysis
- c) 0-100m: Glycolysis
100m-1000m: ATP-CP System
1000m-1500m: Aerobic System
- d) 0-100m: ATP-CP System
100m-1000m: Glycolysis
1000m-1500m: Aerobic System

TOPIC: USING ENERGY TO FUEL EXERCISE

Anaerobic Energy via ATP-CP & Glycolysis

- ◆ When muscle cells deplete their ATP stores, creatine phosphate is used to produce energy anaerobically.
- ◆ **Creatine Phosphate** (_____): high-energy compound stored in muscles that can be used to regenerate ATP.
- ◆ **Glycolysis** converts _____ into 2 pyruvates, while producing 2 ATP.



EXAMPLE

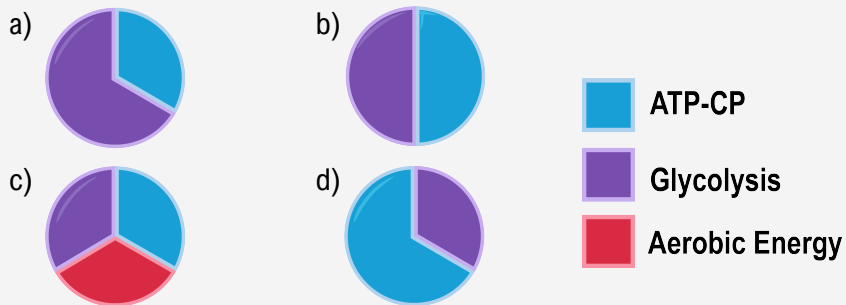
Fill in the blank spaces to complete the table:

Anaerobic Energy (via ATP-CP & Glycolysis)	Aerobic (Oxidative) Energy
Does NOT use oxygen	Uses _____
_____ efficient, produces less ATP	High efficiency, produces _____ of ATP
Produces ATP _____	Takes longer to produce ATP
Used primarily for the first ~3 minutes of activity	Used primarily during _____, sustained activity
Uses creatine phosphate &/or _____	Uses carbs, _____, & limited amounts of protein

TOPIC: USING ENERGY TO FUEL EXERCISE

PRACTICE

Which pie chart best represents the relative contribution of the three ATP-generating energy systems (ATP-CP, glycolysis, & aerobic energy) during a maximal-effort 400-meter sprint lasting ~45 seconds?



PRACTICE

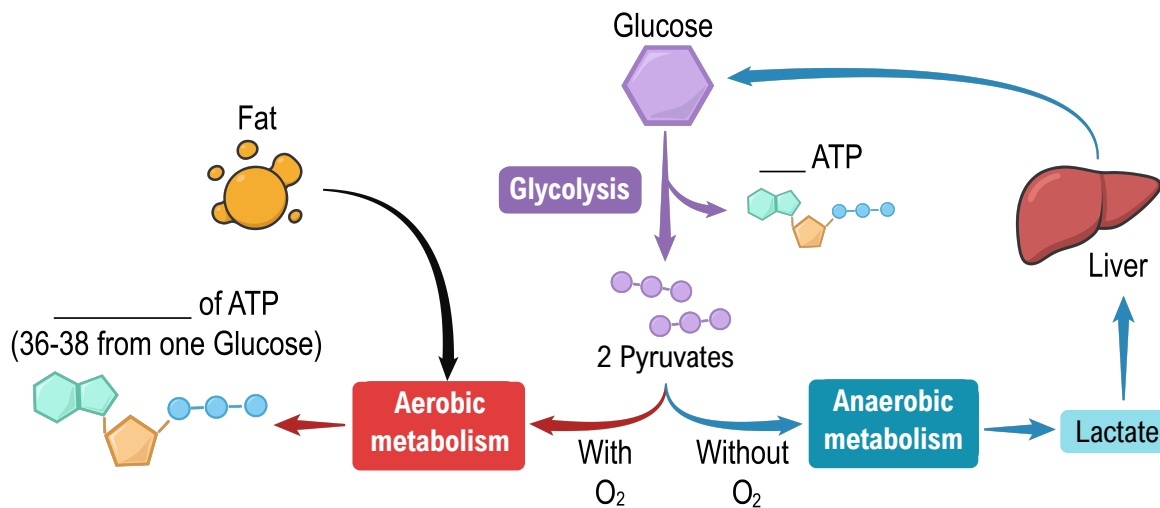
Which of the following statements about the ATP-CP energy system is true?

- a) The phosphate group is cleaved from ATP, binding to creatine & regenerating CP.
- b) The phosphate group is cleaved from CP, binding to ADP & regenerating ATP.
- c) When a phosphate group binds to ADP (regenerating ATP), it releases energy.
- d) All of the above are true.

TOPIC: USING ENERGY TO FUEL EXERCISE

Aerobic Energy & Lactate Production

- ◆ Recall: **aerobic energy** is produced *slowly* but in *large* amounts by primarily breaking down carbs (glucose) & fats.
- ◆ _____ is produced continuously by the body, BUT is produced the most during **anaerobic respiration**.



PRACTICE

Which of the following statements about aerobic energy production is true?

- a) Glucose is the only molecule that can be used to produce ATP aerobically.
- b) In the aerobic pathway, one molecule of glucose can produce 36-38 ATP molecules.
- c) Proteins are the primary source of anaerobically generated ATP.
- d) All of the above are true.