Choose a category.
You will be given the answer.
You must give the correct question.

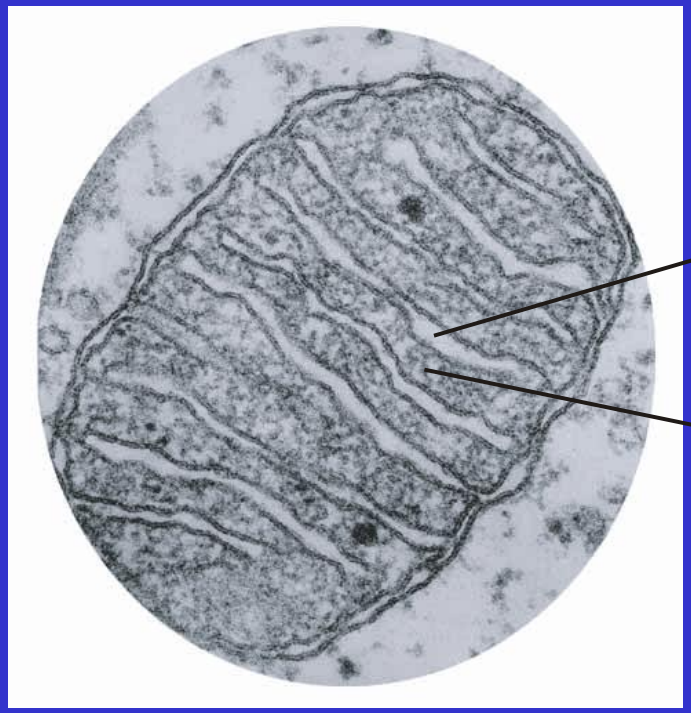
Click to begin.

Choose a point value.

Choose a point value.

Click here for Final Jeopardy

A-part of it all	Relax and Respire	I see the light…	Photosyn-thesize This!	You do not see this box
10 Point	10 Point	10 Point	10 Point	10 Point
20 Points	20 Points	20 Points	20 Points	20 Points
30 Points	30 Points	30 Points	30 Points	30 Points
40 Points	40 Points	40 Points	40 Points	40 Points
50 Points	50 Points	50 Points	50 Points	50 Points



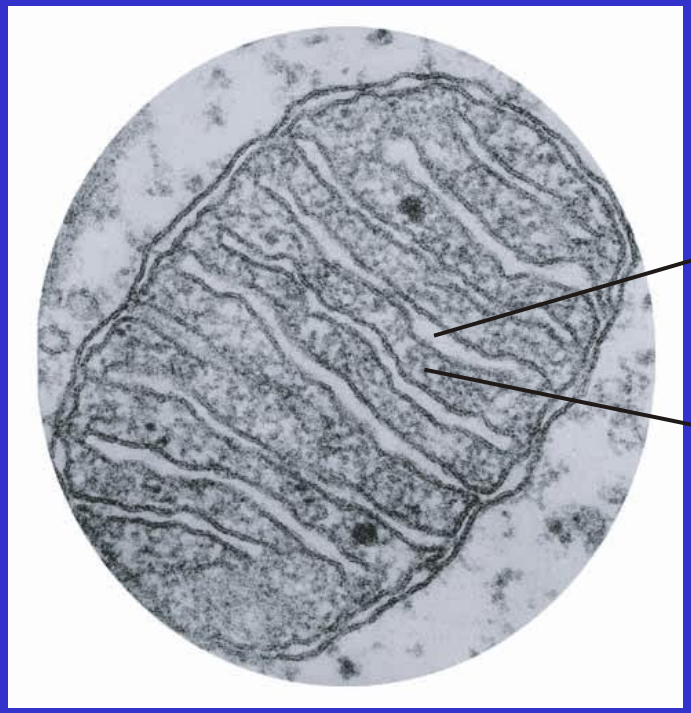
State the name of label A and label B in the photomicrograph above.

A: .....

B: .....

A: cristae / inner membrane;

B: matrix;



State the processes that occur at label A and label B.

A: .....

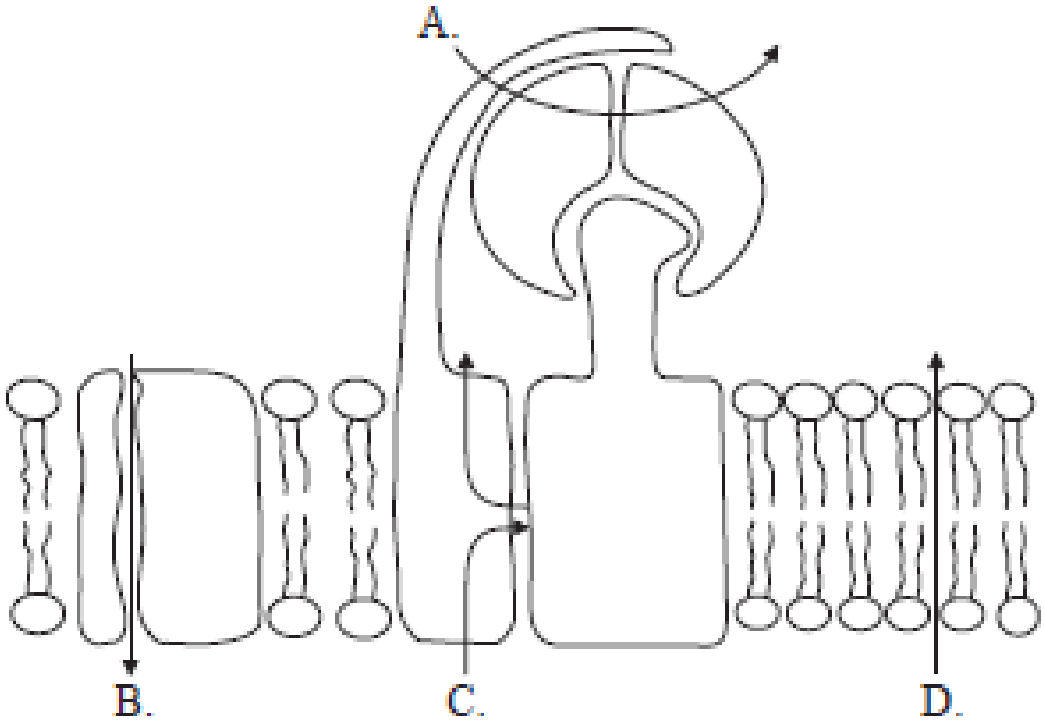
B: .....

(ii) A: electron transport / proton transport;

B: Krebs cycle / ATP synthesis;

3a

The diagram represents components of the cristae in mitochondria. Which arrow indicates how protons (H^+) move to generate ATP directly?



C

Explain the relationship between the structure of the mitochondrion and its function. (3)

(b) large surface area of cristae allows electron transport / oxidative phosphorylation to be very efficient;
matrix provides necessary chemical environment for the Krebs cycle;
small distance between inner and outer membranes allows rapid movement of molecules between cytosol and matrix;
small space between membranes allows protons to be accumulated / concentrated; 3 max

Which of the following features is/are present in mitochondria but not in chloroplasts?

I. DNA and ribosomes
II. Outer and inner membranes
III. Cristae

A. I only
B. II only
C. III only
D. I and III only

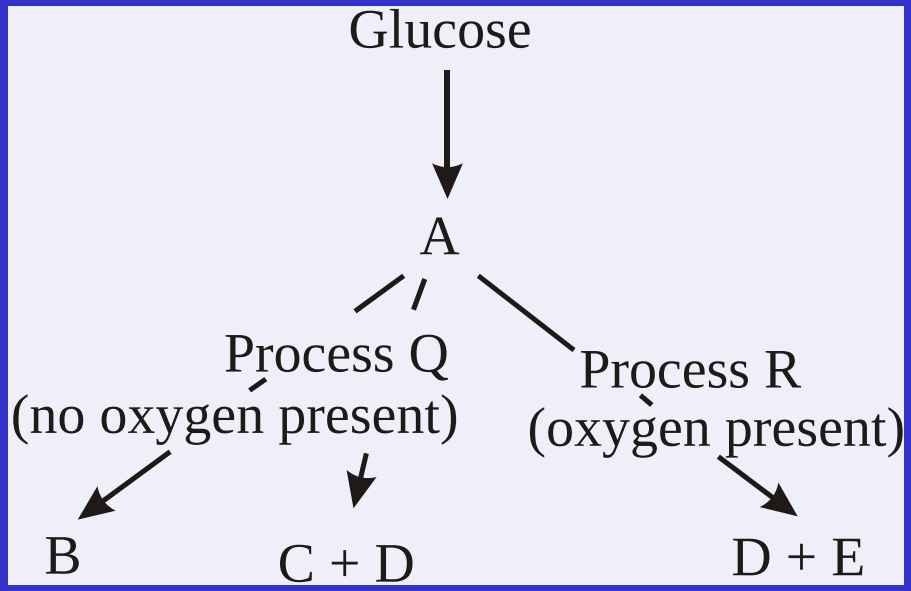
C

What is the net production of ATP, per molecule of glucose during the fermentation of glucose to lactate?

A. 36 molecules
B. 4 molecules
C. 2 molecules
D. None

C

The diagram below shows possible pathways for the breakdown of glucose in various cells.



State the names of processes Q and R.

Q: .....

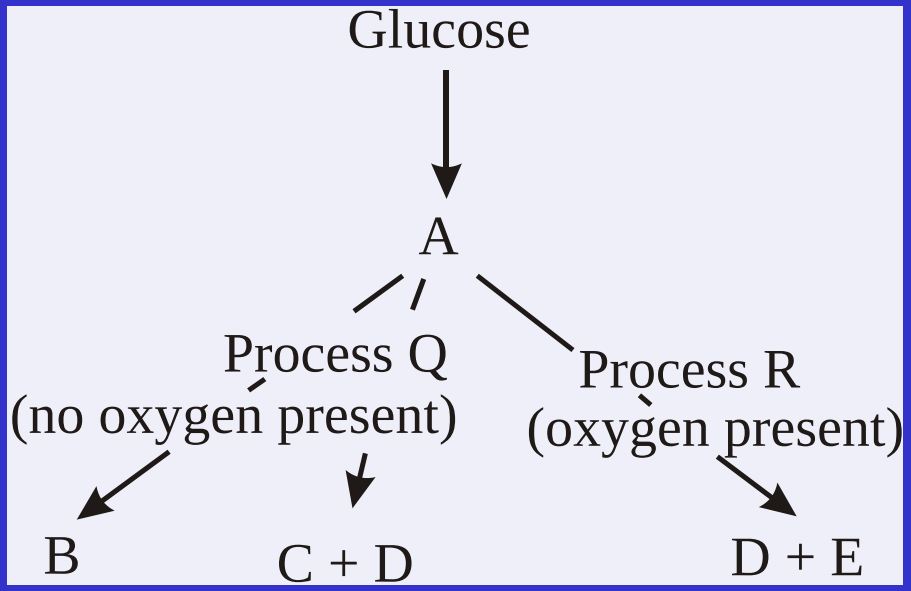
R: .....

Question 2b

Deduce the names of substances A and D.

A: .....

D: .....

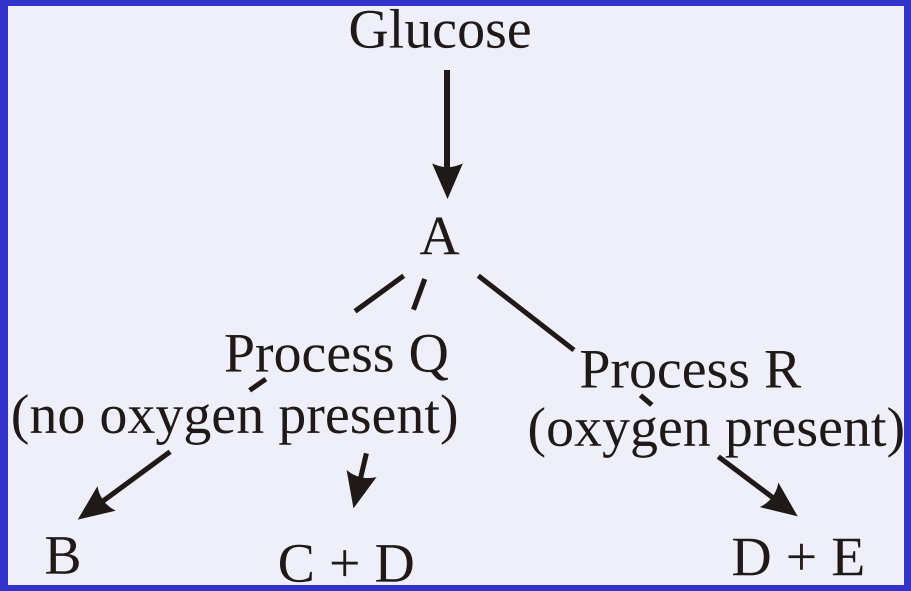


Question 3b

State the organelle in which process R takes place.

.....

.....



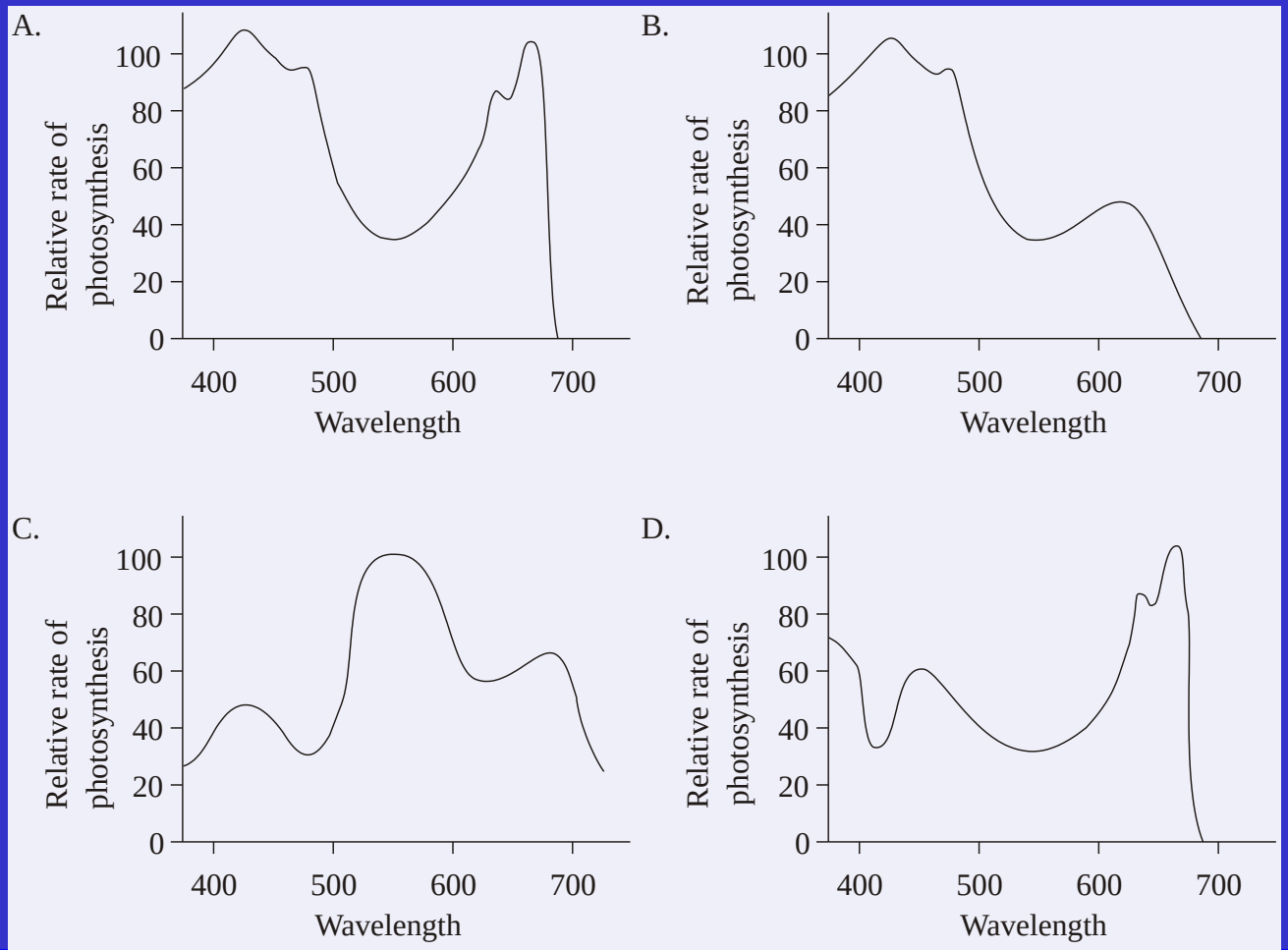
Question 4b

Which of the following produce ATP in mitochondria?

A. The movement of protons from the matrix to the intermembrane space
B. The movement of protons from the intermembrane space to the cytoplasm
C. The splitting of water molecules and the movement of electrons to oxygen
D. The movement of protons from the intermembrane space to the matrix

D

Which diagram represents the action spectrum of photosynthesis?



A

Which two colors of light does chlorophyll absorb most?

A. Red and yellow

B. Green and blue

C. Red and green

D. Red and blue

A

The rate of photosynthesis is affected by light intensity. Draw a line on the graph below to show the relationship between light intensity and the rate of photosynthesis.

Increase with Plateau

Describe how Melvin Calvin used a radioactive isotope to determine products of the light independent reaction.

Chlorella, Lollipop, C14, Boiling Alcohol, bidirectional chromotography

Explain the relationship between the structure of the chloroplast and the light-dependent reactions of photosynthesis.

light dependent reaction occurs in the thylakoid membrane;
thylakoids provide a large surface area;
pigments / chlorophyll is located in the membrane;
in groups of (hundreds of) molecules called photosystems;
folds in thylakoid allow photosystems to be close to each other;
electron carriers embedded in membrane;
$NADP^+$ accepts two high energy electrons and an H^+ from stroma to
form NADPH;
electron flow causes H^+ to be pumped into thylakoid space;
proton gradient formed in space between thylakoids;
H^+ flow back through ATP synthase / synthetase channels to produce ATP;
coupling of electron transport produces ATP / chemiosmosis;
ATP synthase / synthetase embedded in thylakoid;
photolysis of water occurs in thylakoid space; **8 max**

Accept any of the above points if correctly explained using an annotated diagram.

Explain two ways in which the rate of photosynthesis can be measured.

measure oxygen production over a fixed period of time / rate;

collect bubbles of oxygen (from water plant);

or

measure carbon dioxide uptake over a fixed period of time / rate;

measure (colour) change of pH indicator / other method over a fixed

period of time / rate;

or

measure increase in biomass / height / leaf size etc over a fixed period of time / rate;

harvest replicate samples at time intervals for biomass determination; 2 max

What is the advantage of having a small volume inside the thylakoids of the chloroplast?

A. A high proton concentration is rapidly developed.
B. A high electron concentration is rapidly developed.
C. Photosynthetic pigments are highly concentrated.
D. Enzymes of the Calvin cycle are highly concentrated.

A

What is the first identifiable product of carbon dioxide fixation in photosynthesis?

A. Ribulose bisphosphate (RuBP)
B. Glycerate3-phosphate (GP)
C. Triose phosphate (TP)
D. Acetyl CoA

B

State the names of two products of photolysis in photosynthesis.

1. .....
2. .....

oxygen;

hydrogen / reduced NADP (NADPH) / H+ / protons;

ATP;

State two factors in the environment of a plant, apart from light intensity, that can affect the rate of photosynthesis in the plant.

temperature;
carbon dioxide concentration;
water / humidity;

Answer 1e

Question 1e

Answer 2e

Question 2e

Answer 3e

Question 4e

Question 3e

Answer 4e

Answer 5e

Question 5e

Final Jeopardy

Make your wager

Explain the similarities and differences in anaerobic and aerobic cellular respiration. [8]

Answers must include both similarities and differences to receive full marks.
aerobic requires oxygen and anaerobic does not utilize oxygen;

similarities: 3 max

both can start with glucose;
both use glycolysis;
both produce ATP / energy (heat);
both produce pyruvate;
carbon dioxide is produced;
(both start with glycolysis) aerobic leads to Krebs' cycle and anaerobic leads to fermentation;

differences: 5 max

anaerobic:
(fermentation) produces lactic acid in humans;
(fermentation) produces ethanol and CO_2 in yeast;
occurs in cytoplasm of the cell;
recycles NADH (NAD^+);

aerobic cellular respiration:

pyruvate transported to mitochondria;
further oxidized to CO_2 and water (in Krebs' cycle);
produce a larger amount of ATP (36–38 ATP) / anaerobic produces less ATP (2);
can use other compounds / lipids / amino acids for energy;
[8]