Volume-Temperature Relationships for Gases

Activity 1: Basic Relationship

Question Group 1

Question 1

A sample of gas has a constant pressure and number of particles. For such a gas, the relationship between the volume and the Kelvin temperature is best described as a _____ relationship

direct
inverse
quadratic

Question 2

A sample of gas has a constant pressure and number of particles. For such a gas, the relationship between the volume and the Kelvin temperature is best described as a _____ relationship

inverse
quadratic
direct

Question 3

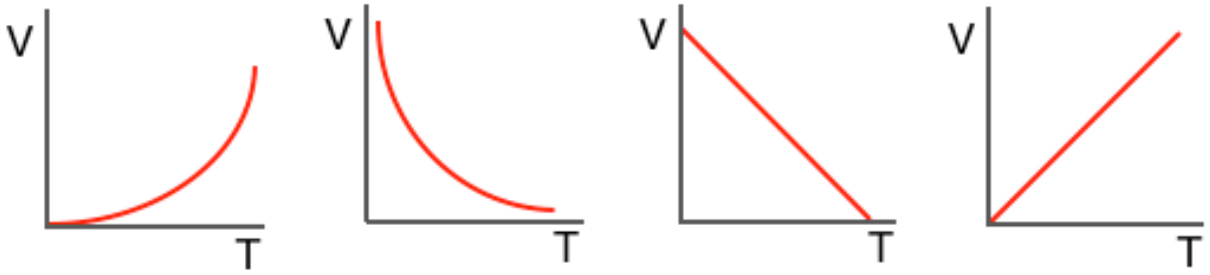
A sample of gas has a constant pressure and number of particles. For such a gas, the relationship between the volume and the Kelvin temperature is best described as a _____ relationship

quadratic
direct
inverse

Question Group 2

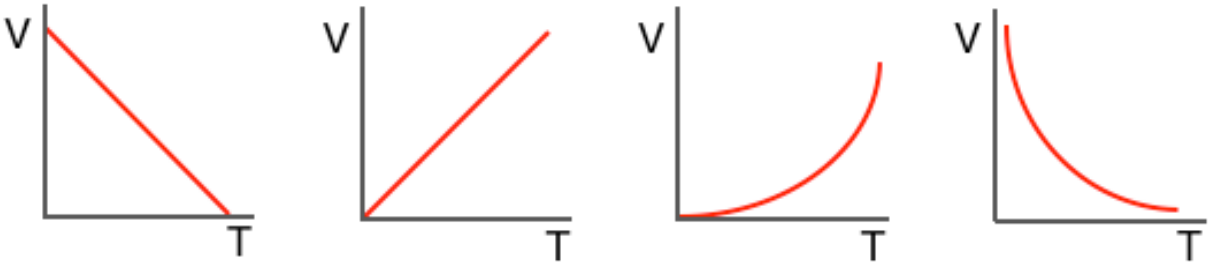
Question 4

Which plot best represents the relationship between the volume and the temperature of a sample of gas? (Assume a constant pressure and number of particles.)



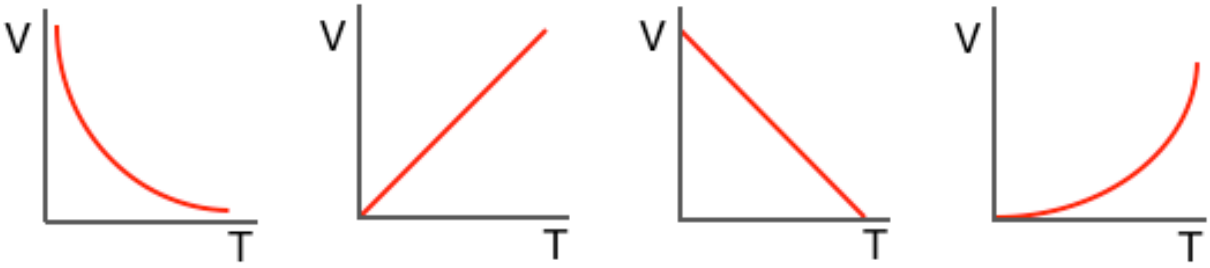
Question 5

Which plot best represents the relationship between the volume and the temperature of a sample of gas? (Assume a constant pressure and number of particles.)



Question 6

Which plot best represents the relationship between the volume and the temperature of a sample of gas? (Assume a constant pressure and number of particles.)



Question Group 3
Question 7
A sample of gas has a constant pressure and number of particles. As the Kelvin temperature of the gas sample is increased, the volume of the gas will _____.
increase
decrease
remain constant

Question 8
A sample of gas has a constant pressure and number of particles. As the Kelvin temperature of the gas sample is increased, the volume of the gas will _____.
decrease
remain constant
increase

Question 9
A sample of gas has a constant pressure and number of particles. As the Kelvin temperature of the gas sample is increased, the volume of the gas will _____.
remain constant
increase
decrease

Activity 2: Proportional Reasoning
Question Group 4
Question 10
Observe the data table shown at the right for a sample of gas that has a constant pressure and number of particles. Use the data table to answer the next two questions.

Trial	Temperature (K)	Volume (L)
1	200	0.80
2	300	1.20
3	400	1.60
4	600	2.40
5	800	3.20

When the Kelvin temperature of the gas is doubled, the volume of the gas becomes _____.
a. Two times larger
b. Four times larger
c. Eight times larger
d. One-half the size
e. One-fourth the size
f. One-eighth the size
g. Not possible to tell

Which pairs of trials demonstrate this relationship? Select all that apply.

a. 1 and 2 b. 1 and 3 c. 1 and 4 d. 1 and 5
e. 2 and 4 f. 2 and 5 g. 3 and 4 h. 3 and 5

Question 11

Observe the data table shown at the right for a sample of gas that has a constant pressure and number of particles. Use the data table to answer the next two questions.

Trial	Temperature (K)	Volume (mL)
1	200	400
2	300	600
3	400	800
4	600	1200
5	800	1600

When the Kelvin temperature of the gas is doubled, the volume of the gas becomes _____.

a. Two times larger
b. Four times larger
c. Eight times larger
d. One-half the size
e. One-fourth the size
f. One-eighth the size
g. Not possible to tell

Which pairs of trials demonstrate this relationship? Select all that apply.

a. 1 and 2 b. 1 and 3 c. 1 and 4 d. 1 and 5
e. 2 and 4 f. 2 and 5 g. 3 and 4 h. 3 and 5

Question Group 5

Question 12

Observe the data table shown at the right for a sample of gas that has a constant pressure and number of particles. Use the data table to answer the next two questions.

Trial	Temperature (K)	Volume (L)
1	200	0.80
2	300	1.20
3	400	1.60
4	600	2.40
5	800	3.20

When the Kelvin temperature of the gas is tripled (increased by a factor of three), the volume of the gas becomes _____.

a. three times larger
b. six times larger
c. nine times larger
d. one-third the size
e. one-sixth the size
f. one-ninth the size
g. Not possible to tell

Which pairs of trials demonstrate this relationship? Select all that apply.

a. 1 and 2 b. 1 and 3 c. 1 and 4 d. 1 and 5
e. 2 and 4 f. 2 and 5 g. 3 and 4 h. 3 and 5

Question 13

Observe the data table shown at the right for a sample of gas that has a constant pressure and number of particles. Use the data table to answer the next two questions.

Trial	Temperature (K)	Volume (mL)
1	200	400
2	300	600
3	400	800
4	600	1200
5	800	1600

When the Kelvin temperature of the gas is tripled (increased by a factor of three), the volume of the gas becomes _____.

a. three times larger
b. six times larger
c. nine times larger
d. one-third the size
e. one-sixth the size
f. one-ninth the size
g. Not possible to tell

Which pairs of trials demonstrate this relationship? Select all that apply.

a. 1 and 2 b. 1 and 3 c. 1 and 4 d. 1 and 5
e. 2 and 4 f. 2 and 5 g. 3 and 4 h. 3 and 5

Question Group 6

Question 14

Observe the data table shown at the right for a sample of gas that has a constant pressure and number of particles. Use the data table to answer the next two questions.

Trial	Temperature (K)	Volume (L)
1	200	0.80
2	300	1.20
3	400	1.60
4	600	2.40
5	800	3.20

When the Kelvin temperature of the gas is quadruple (increased by a factor of four), the volume of the gas becomes _____.

a. four times larger
b. eight times larger
c. sixteen times larger
d. one-fourth the size
e. one-eighth the size
f. one-sixteenth the size
g. Not possible to tell

Which pairs of trials demonstrate this relationship? Select all that apply.

a. 1 and 2 b. 1 and 3 c. 1 and 4 d. 1 and 5
e. 2 and 4 f. 2 and 5 g. 3 and 4 h. 3 and 5

Question 15

Observe the data table shown at the right for a sample of gas that has a constant pressure and number of particles. Use the data table to answer the next two questions.

Trial	Temperature (K)	Volume (mL)
1	200	400
2	300	600
3	400	800
4	600	1200
5	800	1600

When the Kelvin temperature of the gas is quadruple (increased by a factor of four), the volume of the gas becomes _____.

a. four times larger
b. eight times larger
c. sixteen times larger
d. one-fourth the size
e. one-eighth the size
f. one-sixteenth the size
g. Not possible to tell

Which pairs of trials demonstrate this relationship? Select all that apply.

a. 1 and 2 b. 1 and 3 c. 1 and 4 d. 1 and 5
e. 2 and 4 f. 2 and 5 g. 3 and 4 h. 3 and 5

Question Group 7

Question 16

Observe the data table shown at the right for a sample of gas that has a constant pressure and number of particles. Use the data table to predict the volume of the gas when it's temperature is 1000 K.

Trial	Volume (L)	Temperature (K)
1	0.50	250
2	1.00	500
3	1.50	750

Volume at 1000 K: _____

Question 17
Observe the data table shown at the right for a sample of gas that has a constant pressure and number of particles. Use the data table to predict the volume of the gas when it's temperature is 1000 K.

Volume at 1000 K: _____

Trial	Volume (L)	Temperature (K)
1	1.00	250
2	1.50	375
3	2.00	500

Question Group 8
Question 18
Observe the data table shown at the right for a sample of gas that has a constant pressure and number of particles. Use the data table to predict the volume of the gas when it's temperature is 1500 K.

Volume at 1500 K: _____

Trial	Volume (L)	Temperature (K)
1	0.50	250
2	1.00	500
3	1.50	750

Question 19
Observe the data table shown at the right for a sample of gas that has a constant pressure and number of particles. Use the data table to predict the volume of the gas when it's temperature is 1500 K.

Volume at 1500 K: _____

Trial	Volume (L)	Temperature (K)
1	1.00	250
2	1.50	375
3	2.00	500

Question Group 9

Question 20

Observe the data table shown at the right for a sample of gas that has a constant pressure and number of particles. Use the data table to predict the volume of the gas when it's temperature is 2000 K.

Volume at 2000 K: _____

Trial	Volume (L)	Temperature (K)
1	0.50	250
2	1.00	500
3	1.50	750

Question 21

Observe the data table shown at the right for a sample of gas that has a constant pressure and number of particles. Use the data table to predict the volume of the gas when it's temperature is 2000 K.

Volume at 2000 K: _____

Trial	Volume (L)	Temperature (K)
1	1.00	250
2	1.50	375
3	2.00	500

Activity 3: V-T Data
Question Group 10
Question 22
The pressure of a sealed container of gas is kept constant while the temperature is changed. This results in a change in the volume of the gas sample. Based on this information, complete the table below.

Trial	Volume (mL)	Temperature (K)	V/T (mL/K)
1	840	300	
2		450	
3	1456		
4	1726		

Question 23
The pressure of a sealed container of gas is kept constant while the temperature is changed. This results in a change in the volume of the gas sample. Based on this information, complete the table below.

Trial	Volume (mL)	Temperature (K)	V/T (mL/K)
1	780	300	
2		400	
3	1560		
4	2340		

Question 24

The pressure of a sealed container of gas is kept constant while the temperature is changed. This results in a change in the volume of the gas sample. Based on this information, complete the table below.

Trial	Volume (mL)	Temperature (K)	V/T (mL/K)
1	800	250	
2		300	
3	1280		
4	1920		

Question 25

The pressure of a sealed container of gas is kept constant while the temperature is changed. This results in a change in the volume of the gas sample. Based on this information, complete the table below.

Trial	Volume (mL)	Temperature (K)	V/T (mL/K)
1	850	250	
2		350	
3	1360		
4	2380		