Frequency and Period of a Pendulum

Activity 1 Frequency and Period Concepts

Question Group 1

Question 1

A pendulum's frequency describes _____

a. how often it vibrates back and forth.
b. how fast it moves from one extreme to the other
c. how far it moves from its resting position to an extreme position

And a pendulum's period describes _____.

a. how many times it vibrates back and forth
b. how much time it takes to complete one vibration
c. how much distance it travels during one vibration

Question 2

A pendulum's frequency describes _____

a. how far it moves from its resting position to an extreme position
b. how often it vibrates back and forth.
c. how fast it moves from one extreme to the other

And a pendulum's period describes _____.

a. how much distance it travels during one vibration
b. how many times it vibrates back and forth
c. how much time it takes to complete one vibration

Question 3

A pendulum's period describes _____.

a. how many times it vibrates back and forth
b. how much time it takes to complete one vibration
c. how much distance it travels during one vibration

And a pendulum's frequency describes _____

a. how often it vibrates back and forth.
b. how fast it moves from one extreme to the other
c. how far it moves from its resting position to an extreme position

Question 4

A pendulum's period describes _____.

a. how much time it takes to complete one vibration
b. how much distance it travels during one vibration
c. how many times it vibrates back and forth

And a pendulum's frequency describes _____

a. how fast it moves from one extreme to the other
b. how far it moves from its resting position to an extreme position
c. how often it vibrates back and forth.

Question Group 2

Question 5

The unit of frequency is _____.

a. meter per second
b. cycles per second
c. joule per second

And the unit of period is _____.

a. meter
b. second
c. oscillations

Question 6

The unit of frequency is _____.

a. joule per second
b. meter per second
c. cycles per second

And the unit of period is _____.

a. second
b. oscillations
c. meter

Question 7

The unit of period is _____.

a. oscillations
b. meter
c. second

And the unit of frequency is _____.
a. joule per second
b. meter per second
c. cycles per second

Question 8
The unit of period is _____.
a. second
b. oscillations
c. meter

And the unit of frequency is _____.
a. joule per second
b. meter per second
c. cycles per second

Question Group 3
Question 9
A pendulum makes 20 complete vibrational cycles in 40 seconds. This means that _____.
a. the frequency is 2.0 Hertz and the period is 20 seconds
b. the frequency is 0.5 Hertz and the period is 2.0 seconds
c. the frequency is 20 seconds and the period is 2.0 Hertz
d. the frequency is 2.0 seconds and the period is 0.5 Hertz

Question 10
A pendulum makes 40 complete vibrational cycles in 20 seconds. This means that _____.
a. the frequency is 2.0 Hertz and the period is 40 seconds
b. the frequency is 2.0 Hertz and the period is 0.5 seconds
c. the frequency is 40 seconds and the period is 0.5 Hertz
d. the frequency is 2.0 seconds and the period is 0.5 Hertz

Question 11
A pendulum makes 20 complete vibrational cycles in 40 seconds. This means that _____.
a. the period is 2.0 Hertz and the frequency is 20 seconds
b. the period is 0.5 Hertz and the frequency is 2.0 seconds
c. the period is 20 seconds the and frequency is 2.0 Hertz

d. the period is 2.0 seconds and the frequency is 0.5 Hertz

Question 12

A pendulum makes 40 complete vibrational cycles in 20 seconds. This means that _____.

a. the period is 0.5 Hertz and the frequency is 40 seconds
b. the period is 0.5 Hertz and the frequency is 2.0 seconds
c. the period is 40 seconds and the frequency is 2.0 Hertz
d. the period is 0.5 seconds and the frequency is 2.0 Hertz

Question Group 4

Question 13

The period of a pendulum's vibrations depends mostly upon _____. Choose one.

a. the mass of the bob
b. the width of the string from which it is suspended
c. the length of the string from which it is supspended
d. the amplitude of motion with which it swings

Question 14

The period of a pendulum's vibrations depends mostly upon _____. Choose one.

a. the amplitude of motion with which it swings
b. the mass of the bob
c. the width of the string from which it is suspended
d. the length of the string from which it is supspended

Question 15

The period of a pendulum's vibrations depends mostly upon _____. Choose one.

a. the length of the string from which it is supspended
b. the amplitude of motion with which it swings
c. the mass of the bob
d. the width of the string from which it is suspended

Question 16

The period of a pendulum's vibrations depends mostly upon _____. Choose one.

a. the width of the string from which it is suspended
b. the length of the string from which it is supspended
c. the amplitude of motion with which it swings
d. the mass of the bob

Question Group 5
Question 17
As the frequency of a pendulum's vibrations increases, …
a. the period of vibration also increases.
b. the period of vibration decreases.
c. the period of vibration is unaffected.
d. the period of vibration increases at first; then it decreases.

Question 18
As the frequency of a pendulum's vibrations increases, …
a. the period of vibration increases at first; then it decreases.
b. the period of vibration also increases.
c. the period of vibration decreases.
d. the period of vibration is unaffected.

Question 19
As the frequency of a pendulum's vibrations increases, …
a. the period of vibration is unaffected.
b. the period of vibration increases at first; then it decreases.
c. the period of vibration also increases.
d. the period of vibration decreases.

Question 20
As the frequency of a pendulum's vibrations increases, …
a. the period of vibration decreases.
b. the period of vibration also increases.
c. the period of vibration increases at first; then it decreases.
d. the period of vibration is unaffected.

Question Group 6
Question 21
Which one change is certain to increase the period of a pendulum's vibrations?
a. Decrease the mass of the pendulum bob.
b. Increase the angle theta through which it swings.
c. Increase the length of the string upon which the bob is suspended.
d. Use a heavier string to suspend the pendulum bob on.

Question 22
Which one change is certain to increase the period of a pendulum's vibrations?
a. Increase the angle theta through which it swings.
b. Increase the length of the string upon which the bob is suspended.
c. Use a heavier string to suspend the pendulum bob on.
d. Decrease the mass of the pendulum bob.

Question 23
Which one change is certain to decrease the period of a pendulum's vibrations?
a. Increase the mass of the pendulum bob.
b. Decrease the angle theta through which it swings.
c. Decrease the length of the string upon which the bob is suspended.
d. Use a lighter string to suspend the pendulum bob on.

Question 24
Which one change is certain to decrease the period of a pendulum's vibrations?
a. Decrease the angle theta through which it swings.
b. Decrease the length of the string upon which the bob is suspended.
c. Use a lighter string to suspend the pendulum bob on.
d. Increase the mass of the pendulum bob.

Activity 2 Frequency and Period Ranking Tasks
Question Group 7
Question 25
Anna Litical is studying the effect of string length (L), bob mass (m), and swing angle (Θ) upon the period of a pendulum. The parameter values used for three trials are shown. Rank the three trials in order of their period (T).

Trial 1	**Trial 2**	**Trial 3**
L = 1.25 m	L = 1.10 m	L = 1.00 m
m = 0.250 kg	m = 0.250 kg	m = 0.250 kg
Θ = 30°	Θ = 20°	Θ = 45°

Question 26
Anna Litical is studying the effect of string length (L), bob mass (m), and swing angle (Θ) upon the period of a pendulum. The parameter values used for three trials are shown. Rank the three trials in order of their period (T).

Trial 1	**Trial 2**	**Trial 3**
L = 1.00 m	L = 1.25 m	L = 1.10 m
m = 0.250 kg	m = 0.250 kg	m = 0.250 kg
Θ = 45°	Θ = 30°	Θ = 20°

Question 27
Anna Litical is studying the effect of string length (L), bob mass (m), and swing angle (Θ) upon the period of a pendulum. The parameter values used for three trials are shown. Rank the three trials in order of their period (T).

Trial 1	**Trial 2**	**Trial 3**
L = 1.10 m	L = 1.00 m	L = 1.25 m
m = 0.250 kg	m = 0.250 kg	m = 0.250 kg
Θ = 20°	Θ = 45°	Θ = 30°

Question 28
Anna Litical is studying the effect of string length (L), bob mass (m), and swing angle (Θ) upon the period of a pendulum. The parameter values used for three trials are shown. Rank the three trials in order of their period (T).

Trial 1	**Trial 2**	**Trial 3**
L = 1.10 m	L = 1.25 m	L = 1.00 m
m = 0.250 kg	m = 0.250 kg	m = 0.250 kg
Θ = 20°	Θ = 30°	Θ = 45°

Question Group 8

Question 29

Anna Litical is studying the effect of string length (L), bob mass (m), and swing angle (Θ) upon the period of a pendulum. The parameter values used for three trials are shown. Rank the three trials in order of their period (T).

Trial 1	**Trial 2**	**Trial 3**
L = 85.0 cm	L = 65.0 cm	L = 50.0 cm
m = 0.500 kg	m = 0.500 kg	m = 0.500 kg
Θ = 20°	Θ = 25°	Θ = 40°

Question 30

Anna Litical is studying the effect of string length (L), bob mass (m), and swing angle (Θ) upon the period of a pendulum. The parameter values used for three trials are shown. Rank the three trials in order of their period (T).

Trial 1	**Trial 2**	**Trial 3**
L = 50.0 cm	L = 85.0 cm	L = 65.0 cm
m = 0.500 kg	m = 0.500 kg	m = 0.500 kg
Θ = 40°	Θ = 20°	Θ = 25°

Question 31

Anna Litical is studying the effect of string length (L), bob mass (m), and swing angle (Θ) upon the period of a pendulum. The parameter values used for three trials are shown. Rank the three trials in order of their period (T).

Trial 1	**Trial 2**	**Trial 3**
L = 65.0 cm	L = 50.0 cm	L = 85.0 cm
m = 0.500 kg	m = 0.500 kg	m = 0.500 kg
Θ = 25°	Θ = 40°	Θ = 20°

Question 32

Anna Litical is studying the effect of string length (L), bob mass (m), and swing angle (Θ) upon the period of a pendulum. The parameter values used for three trials are shown. Rank the three trials in order of their period (T).

Trial 1	**Trial 2**	**Trial 3**
L = 50.0 cm	L = 65.0 cm	L = 85.0 cm
m = 0.500 kg	m = 0.500 kg	m = 0.500 kg
Θ = 40°	Θ = 25°	Θ = 20°

Question Group 9
Question 33
Anna Litical is studying the effect of string length (L), bob mass (m), and swing angle (Θ) upon the frequency of a pendulum's vibrations. The parameter values used for three trials are shown. Rank the three trials in order of their frequency (f).

Trial 1	**Trial 2**	**Trial 3**
L = 1.05 m	L = 1.25 m	L = 1.40 m
m = 0.400 kg	m = 0.500 kg	m = 0.250 kg
Θ = 35°	Θ = 35°	Θ = 35°

Question 34
Anna Litical is studying the effect of string length (L), bob mass (m), and swing angle (Θ) upon the frequency of a pendulum's vibrations. The parameter values used for three trials are shown. Rank the three trials in order of their frequency (f).

Trial 1	**Trial 2**	**Trial 3**
L = 1.40 m	L = 1.05 m	L = 1.25 m
m = 0.250 kg	m = 0.400 kg	m = 0.500 kg
Θ = 35°	Θ = 35°	Θ = 35°

Question 35
Anna Litical is studying the effect of string length (L), bob mass (m), and swing angle (Θ) upon the frequency of a pendulum's vibrations. The parameter values used for three trials are shown. Rank the three trials in order of their frequency (f).

Trial 1	**Trial 2**	**Trial 3**
L = 1.25 m	L = 1.40 m	L = 1.05 m
m = 0.500 kg	m = 0.250 kg	m = 0.400 kg
Θ = 35°	Θ = 35°	Θ = 35°

Question 36
Anna Litical is studying the effect of string length (L), bob mass (m), and swing angle (Θ) upon the frequency of a pendulum's vibrations. The parameter values used for three trials are shown. Rank the three trials in order of their frequency (f).

Trial 1	**Trial 2**	**Trial 3**
L = 1.05 m	L = 1.40 m	L = 1.25 m
m = 0.400 kg	m = 0.250 kg	m = 0.500 kg
Θ = 35°	Θ = 35°	Θ = 35°

Activity 3 Proportional Reasoning
Question Group 10
Question 37
Noah Formula is conducting an experimental study of the **period** of a pendulum. If Noah **increases the length of the string by a factor of two**, then he can expect the **period** of the pendulum to …
a. increase by a factor of 2.
b. increase by a factor of 4.
c. increase by a factor of the square root of 2.
d. decrease by a factor of 2.
e. decrease by a factor of 4.
f. decrease by a factor of the square root of 2.
g. not be affected by the length change.

Question 38
Noah Formula is conducting an experimental study of the **period** of a pendulum. If Noah **increases the length of the string by a factor of two**, then he can expect the **period** of the pendulum to …
a. increase by a factor of 2.
b. decrease by a factor of 2.
c. increase by a factor of the square root of 2.
d. decrease by a factor of the square root of 2.
e. increase by a factor of 4.
f. decrease by a factor of 4.
g. not be affected by the length change.

Question 39
Noah Formula is conducting an experimental study of the **period** of a pendulum. If Noah **decreases the length of the string by a factor of two**, then he can expect the **period** of the pendulum to …
a. increase by a factor of 2.
b. increase by a factor of 4.
c. increase by a factor of the square root of 2.
d. decrease by a factor of 2.
e. decrease by a factor of 4.
f. decrease by a factor of the square root of 2.
g. not be affected by the length change.

Question 40
Noah Formula is conducting an experimental study of the **period** of a pendulum. If Noah **decreases the length of the string by a factor of two**, then he can expect the **period** of the pendulum to …
a. increase by a factor of 2.
b. decrease by a factor of 2.
c. increase by a factor of the square root of 2.
d. decrease by a factor of the square root of 2.
e. increase by a factor of 4.
f. decrease by a factor of 4.
g. not be affected by the length change.

Question Group 11
Question 41

Noah Formula is conducting an experimental study of the **period** of a pendulum. If Noah **increases the length of the string by a factor of three**, then he can expect the **period** of the pendulum to …

a. increase by a factor of 3.
b. increase by a factor of 9.
c. increase by a factor of the square root of 3.
d. decrease by a factor of 3.
e. decrease by a factor of 9.
f. decrease by a factor of the square root of 3.
g. not be affected by the length change.

Question 42

Noah Formula is conducting an experimental study of the **period** of a pendulum. If Noah **increases the length of the string by a factor of three**, then he can expect the **period** of the pendulum to …

a. increase by a factor of 3.
b. decrease by a factor of 3.
c. increase by a factor of the square root of 3.
d. decrease by a factor of the square root of 3.
e. increase by a factor of 9.
f. decrease by a factor of 9.
g. not be affected by the length change.

Question 43

Noah Formula is conducting an experimental study of the **period** of a pendulum. If Noah **decreases the length of the string by a factor of three**, then he can expect the **period** of the pendulum to …

a. increase by a factor of 3.
b. increase by a factor of 9.
c. increase by a factor of the square root of 3.
d. decrease by a factor of 3.
e. decrease by a factor of 9.
f. decrease by a factor of the square root of 3.
g. not be affected by the length change.

Question 44

Noah Formula is conducting an experimental study of the **period** of a pendulum. If Noah **decreases the length of the string by a factor of three**, then he can expect the **period** of the pendulum to …

a. increase by a factor of 3.

b. decrease by a factor of 3.
c. increase by a factor of the square root of 3.
d. decrease by a factor of the square root of 3.
e. increase by a factor of 9.
f. decrease by a factor of 9.
g. not be affected by the length change.

Question Group 12
Question 45
Noah Formula is conducting an experimental study of the **frequency** of a pendulum. If Noah **increases the length of the string by a factor of two**, then he can expect the **frequency** of the pendulum to …
a. increase by a factor of 2.
b. increase by a factor of 4.
c. increase by a factor of the square root of 2.
d. decrease by a factor of 2.
e. decrease by a factor of 4.
f. decrease by a factor of the square root of 2.
g. not be affected by the length change.

Question 46
Noah Formula is conducting an experimental study of the **frequency** of a pendulum. If Noah **increases the length of the string by a factor of two**, then he can expect the **frequency** of the pendulum to …
a. increase by a factor of 2.
b. decrease by a factor of 2.
c. increase by a factor of the square root of 2.
d. decrease by a factor of the square root of 2.
e. increase by a factor of 4.
f. decrease by a factor of 4.
g. not be affected by the length change.

Question 47
Noah Formula is conducting an experimental study of the **frequency** of a pendulum. If Noah **decreases the length of the string by a factor of two**, then he can expect the **frequency** of the pendulum to …
a. increase by a factor of 2.
b. increase by a factor of 4.
c. increase by a factor of the square root of 2.
d. decrease by a factor of 2.

e. decrease by a factor of 4.
f. decrease by a factor of the square root of 2.
g. not be affected by the length change.

Question 48

Noah Formula is conducting an experimental study of the **frequency** of a pendulum. If Noah **decreases the length of the string by a factor of two**, then he can expect the **frequency** of the pendulum to …

a. increase by a factor of 2.
b. decrease by a factor of 2.
c. increase by a factor of the square root of 2.
d. decrease by a factor of the square root of 2.
e. increase by a factor of 4.
f. decrease by a factor of 4.
g. not be affected by the length change.

Question Group 13

Question 49

Noah Formula is conducting an experimental study of the **frequency** of a pendulum. If Noah **increases the length of the string by a factor of three**, then he can expect the **frequency** of the pendulum to …

a. increase by a factor of 3.
b. increase by a factor of 9.
c. increase by a factor of the square root of 3.
d. decrease by a factor of 3.
e. decrease by a factor of 9.
f. decrease by a factor of the square root of 3.
g. not be affected by the length change.

Question 50

Noah Formula is conducting an experimental study of the **frequency** of a pendulum. If Noah **increases the length of the string by a factor of three**, then he can expect the **frequency** of the pendulum to …

a. increase by a factor of 3.
b. decrease by a factor of 3.
c. increase by a factor of the square root of 3.
d. decrease by a factor of the square root of 3.
e. increase by a factor of 9.
f. decrease by a factor of 9.
g. not be affected by the length change.

Question 51
Noah Formula is conducting an experimental study of the **frequency** of a pendulum. If Noah **decreases the length of the string by a factor of three**, then he can expect the **frequency** of the pendulum to …
a. increase by a factor of 3.
b. increase by a factor of 9.
c. increase by a factor of the square root of 3.
d. decrease by a factor of 3.
e. decrease by a factor of 9.
f. decrease by a factor of the square root of 3.
g. not be affected by the length change.

Question 52
Noah Formula is conducting an experimental study of the **frequency** of a pendulum. If Noah **decreases the length of the string by a factor of three**, then he can expect the **frequency** of the pendulum to …
a. increase by a factor of 3.
b. decrease by a factor of 3.
c. increase by a factor of the square root of 3.
d. decrease by a factor of the square root of 3.
e. increase by a factor of 9.
f. decrease by a factor of 9.
g. not be affected by the length change.

Question Group 14
Question 53
Noah Formula is conducting an experimental study of the **period** of a pendulum. If Noah **increases the mass of the string by a factor of two**, then he can expect the **period** of the pendulum to …
a. increase by a factor of 2.
b. increase by a factor of 4.
c. increase by a factor of the square root of 2.
d. decrease by a factor of 2.
e. decrease by a factor of 4.
f. decrease by a factor of the square root of 2.
g. not be affected by the mass change.

Question 54
Noah Formula is conducting an experimental study of the **period** of a pendulum. If Noah **increases the mass of the string by a factor of two**, then he can expect the **period** of the pendulum to …
a. increase by a factor of 2.
b. decrease by a factor of 2.
c. increase by a factor of the square root of 2.
d. decrease by a factor of the square root of 2.
e. increase by a factor of 4.
f. decrease by a factor of 4.
g. not be affected by the mass change.

Question 55
Noah Formula is conducting an experimental study of the **period** of a pendulum. If Noah **decreases the mass of the string by a factor of two**, then he can expect the **period** of the pendulum to …
a. increase by a factor of 2.
b. increase by a factor of 4.
c. increase by a factor of the square root of 2.
d. decrease by a factor of 2.
e. decrease by a factor of 4.
f. decrease by a factor of the square root of 2.
g. not be affected by the mass change.

Question 56
Noah Formula is conducting an experimental study of the **period** of a pendulum. If Noah **decreases the mass of the string by a factor of two**, then he can expect the **period** of the pendulum to …
a. increase by a factor of 2.
b. decrease by a factor of 2.
c. increase by a factor of the square root of 2.
d. decrease by a factor of the square root of 2.
e. increase by a factor of 4.
f. decrease by a factor of 4.
g. not be affected by the mass change.

Question Group 15
Question 57

Noah Formula is conducting an experimental study of the **period** of a pendulum. If Noah **increases the mass of the string by a factor of three**, then he can expect the **period** of the pendulum to …

a. increase by a factor of 3.
b. increase by a factor of 9.
c. increase by a factor of the square root of 3.
d. decrease by a factor of 3.
e. decrease by a factor of 9.
f. decrease by a factor of the square root of 3.
g. not be affected by the mass change.

Question 58

Noah Formula is conducting an experimental study of the **period** of a pendulum. If Noah **increases the mass of the string by a factor of three**, then he can expect the **period** of the pendulum to …

a. increase by a factor of 3.
b. decrease by a factor of 3.
c. increase by a factor of the square root of 3.
d. decrease by a factor of the square root of 3.
e. increase by a factor of 9.
f. decrease by a factor of 9.
g. not be affected by the mass change.

Question 59

Noah Formula is conducting an experimental study of the **period** of a pendulum. If Noah **decreases the mass of the string by a factor of three**, then he can expect the **period** of the pendulum to …

a. increase by a factor of 3.
b. increase by a factor of 9.
c. increase by a factor of the square root of 3.
d. decrease by a factor of 3.
e. decrease by a factor of 9.
f. decrease by a factor of the square root of 3.
g. not be affected by the mass change.

Question 60

Noah Formula is conducting an experimental study of the **period** of a pendulum. If Noah **decreases the mass of the string by a factor of three**, then he can expect the **period** of the pendulum to …

a. increase by a factor of 3.
b. decrease by a factor of 3.

c. increase by a factor of the square root of 3.
d. decrease by a factor of the square root of 3.
e. increase by a factor of 9.
f. decrease by a factor of 9.
g. not be affected by the mass change.