## Algebra II

## Lesson \#6 Unit 9

Class Worksheet \#6
For Worksheet \#7

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S_{8}=3
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The first term is 3.

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S_{8}=3+6
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S_{8}=3+6+12
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S_{8}=3+6+12+24
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S_{8}=3+6+12+\underset{\sim}{24}+48
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S_{8}=3+6+12+24+48+96
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S_{8}=3+6+12+24+48+96+192
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Multiply both sides of the equation by $r$. ( 2 in this case)

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$2 S_{8}$

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\begin{aligned}
S_{8} & =3+6+12+24+48+96+192+384 \\
2 S_{8} & =6
\end{aligned}
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Multiply both sides of the equation by $r$. ( 2 in this case)

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S_{8} & =3+6+12+24+48+96+192+384 \\
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S_{8}=3+6+12+24+48+96+192+384 \\
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S_{8}-2 S_{8}
\end{gathered}
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S_{8}-2 S_{8}=3-768
\end{gathered}
$$

Notice that these terms all 'cancelled each other out' in the subtraction process.

Subtract the two equations.
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Next, we will factor each side.

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Next, we will factor each side.

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For a geometric sequence, $a_{n}=a_{1} r^{n-1}$

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Once again, notice that these terms all 'cancelled each other out' in the subtraction process.

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\end{aligned}
$$

Now, make a substitution.

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio.
There is another, equivalent formula, for this that is useful.

$$
\begin{aligned}
& \quad \mathbf{a}_{1}\left(1-\mathbf{r}^{\mathrm{n}}\right)=\mathbf{a}_{1}-\mathbf{a}_{1} \mathbf{r}^{\mathrm{n}}=\mathbf{a}_{1}-\mathbf{r} \mathbf{a}_{\mathrm{n}} \\
& \text { Since } \mathbf{a}_{\mathrm{n}}=\mathbf{a}_{1} \mathbf{r}^{\mathrm{n}-1}, \mathbf{r} \mathbf{a}_{\mathrm{n}}=\mathbf{a}_{1} \mathbf{r}^{\mathbf{n}} .
\end{aligned}
$$

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
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& \text { Since } \mathbf{a}_{\mathrm{n}}=\mathbf{a}_{1} \mathbf{r}^{\mathrm{n}-1}, \mathbf{r} \mathbf{a}_{\mathrm{n}}=\mathbf{a}_{1} \mathbf{r}^{\mathbf{n}} .
\end{aligned}
$$

Therefore, substituting again, we get

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio.
There is another, equivalent formula, for this that is useful.

$$
\begin{aligned}
& \quad a_{1}\left(1-r^{n}\right)=a_{1}-a_{1} r^{n}=a_{1}-r a_{n} \\
& \text { Since } a_{n}=a_{1} r^{n-1}, r_{n}=a_{1} r^{n} .
\end{aligned}
$$

Therefore, substituting again, we get

$$
S_{n}=
$$

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio.
There is another, equivalent formula, for this that is useful.

$$
\begin{aligned}
& \quad a_{1}\left(1-r^{n}\right)=a_{1}-a_{1} r^{n}=a_{1}-r a_{n} \\
& \text { Since } a_{n}=a_{1} r^{n-1}, r a_{n}=a_{1} r^{n} .
\end{aligned}
$$

Therefore, substituting again, we get

$$
S_{n}=\xrightarrow[\mathbf{a}_{1}-\mathbf{r} \mathbf{a}_{\mathbf{n}} \leftarrow]{ }
$$

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio.
There is another, equivalent formula, for this that is useful.

$$
\begin{aligned}
& \quad a_{1}\left(1-r^{n}\right)=a_{1}-a_{1} r^{n}=a_{1}-r a_{n} \\
& \text { Since } a_{n}=a_{1} r^{n-1}, r_{n}=a_{1} r^{n} .
\end{aligned}
$$

Therefore, substituting again, we get

$$
S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio.
There is another, equivalent formula, for this that is useful.

$$
\begin{aligned}
& \quad a_{1}\left(1-r^{n}\right)=a_{1}-a_{1} r^{n}=a_{1}-r a_{n} \\
& \text { Since } a_{n}=a_{1} r^{n-1}, r a_{n}=a_{1} r^{n} .
\end{aligned}
$$

Therefore, substituting again, we get

$$
S_{n}=\frac{\mathbf{a}_{1}-\mathbf{r} \mathbf{a}_{\mathbf{n}}}{1-\mathbf{r}}
$$

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio.

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio.
We will evaluate and compare $S_{5}$ in 4 different geometric series.
$\# 1: a_{1}=1, r=0.5$
\#2: $\mathrm{a}_{1}=1, \mathrm{r}=\mathbf{- 0 . 5}$
\#3: $\mathrm{a}_{1}=1, \mathrm{r}=2$
\#4: $a_{1}=1, r=-2$

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio.
We will evaluate and compare $S_{5}$ in $\mathbf{4}$ different geometric series.

$$
\# 1: a_{1}=1, r=0.5
$$

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio.
We will evaluate and compare $S_{5}$ in $\mathbf{4}$ different geometric series.

$$
\begin{gathered}
\# 1: a_{1}=1, r=0.5 \\
S_{5}=
\end{gathered}
$$

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio.
We will evaluate and compare $S_{5}$ in $\mathbf{4}$ different geometric series.

$$
\begin{gathered}
\# 1: a_{1}=1, r=0.5 \\
S_{5}=1
\end{gathered}
$$

The first term is $\mathbf{1 .}$

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio.
We will evaluate and compare $S_{5}$ in $\mathbf{4}$ different geometric series.

$$
\begin{gathered}
\# 1: a_{1}=1, r=0.5 \\
S_{5}=1
\end{gathered}
$$

The first term is 1 . Now multiply by 0.5 recursively.

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio.
We will evaluate and compare $S_{5}$ in $\mathbf{4}$ different geometric series.
$\# 1: a_{1}=1, r=0.5$

$$
S_{5}=1+0.5
$$

The first term is 1 . Now multiply by 0.5 recursively.

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio.
We will evaluate and compare $S_{5}$ in $\mathbf{4}$ different geometric series.
\#1: $a_{1}=1, r=0.5$

$$
S_{5}=1+0.5+0.25
$$

The first term is 1 . Now multiply by 0.5 recursively.

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio.
We will evaluate and compare $S_{5}$ in $\mathbf{4}$ different geometric series.
\#1: $a_{1}=1, r=0.5$

$$
S_{5}=1+0.5+0.25+0.125
$$

The first term is 1 . Now multiply by 0.5 recursively.

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio.
We will evaluate and compare $S_{5}$ in $\mathbf{4}$ different geometric series.
\#1: $a_{1}=1, r=0.5$

$$
S_{5}=1+0.5+0.25+0.125+0.0625
$$

The first term is 1 . Now multiply by 0.5 recursively.

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio.
We will evaluate and compare $S_{5}$ in $\mathbf{4}$ different geometric series.

$$
\begin{aligned}
& \# 1: \mathrm{a}_{1}=1, \mathrm{r}=0.5 \\
& \quad \mathrm{~S}_{5}=1+0.5+0.25+0.125+0.0625=
\end{aligned}
$$

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio.
We will evaluate and compare $S_{5}$ in $\mathbf{4}$ different geometric series.

$$
\begin{aligned}
& \# 1: a_{1}=1, r=0.5 \\
& \quad S_{5}=1+0.5+0.25+0.125+0.0625=1.9375
\end{aligned}
$$

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio.
We will evaluate and compare $S_{5}$ in 4 different geometric series.

$$
\begin{aligned}
& \# 1: a_{1}=1, r=0.5 \\
& \quad S_{5}=1+0.5+0.25+0.125+0.0625=1.9375
\end{aligned}
$$

\#2: $\mathrm{a}_{1}=1, \mathrm{r}=-0.5$

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio.
We will evaluate and compare $S_{5}$ in 4 different geometric series.

$$
\begin{aligned}
& \# 1: a_{1}=1, r=0.5 \\
& \quad S_{5}=1+0.5+0.25+0.125+0.0625=1.9375
\end{aligned}
$$

$$
\# 2: a_{1}=1, r=-0.5
$$

$$
S_{5}=
$$

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio.
We will evaluate and compare $S_{5}$ in 4 different geometric series.

$$
\begin{aligned}
& \# 1: a_{1}=1, r=0.5 \\
& \quad S_{5}=1+0.5+0.25+0.125+0.0625=1.9375
\end{aligned}
$$

$$
\# 2: a_{1}=1, r=-0.5
$$

$$
S_{5}=1
$$

The first term is $\mathbf{1 .}$

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio.
We will evaluate and compare $S_{5}$ in 4 different geometric series.

$$
\begin{aligned}
& \# 1: a_{1}=1, r=0.5 \\
& \quad S_{5}=1+0.5+0.25+0.125+0.0625=1.9375
\end{aligned}
$$

$$
\# 2: a_{1}=1, r=-0.5
$$

$$
S_{5}=1
$$

The first term is $\mathbf{1}$. Now multiply by $\mathbf{- 0 . 5}$ recursively.

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio.
We will evaluate and compare $S_{5}$ in 4 different geometric series.

$$
\begin{aligned}
& \# 1: a_{1}=1, r=0.5 \\
& \quad S_{5}=1+0.5+0.25+0.125+0.0625=1.9375
\end{aligned}
$$

$$
\# 2: a_{1}=1, r=-0.5
$$

$$
S_{5}=1+-0.5
$$

The first term is $\mathbf{1}$. Now multiply by $\mathbf{- 0 . 5}$ recursively.

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio.
We will evaluate and compare $S_{5}$ in 4 different geometric series.

$$
\begin{aligned}
& \# 1: a_{1}=1, r=0.5 \\
& \quad S_{5}=1+0.5+0.25+0.125+0.0625=1.9375
\end{aligned}
$$

\#2: $a_{1}=1, r=-0.5$

$$
S_{5}=1+-0.5+0.25
$$

The first term is $\mathbf{1}$. Now multiply by $\mathbf{- 0 . 5}$ recursively.

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio.
We will evaluate and compare $S_{5}$ in 4 different geometric series.

$$
\begin{aligned}
& \# 1: a_{1}=1, r=0.5 \\
& \quad S_{5}=1+0.5+0.25+0.125+0.0625=1.9375
\end{aligned}
$$

$$
\# 2: a_{1}=1, r=-0.5
$$

$$
S_{5}=1+-0.5+0.25+-0.125
$$

The first term is $\mathbf{1}$. Now multiply by $\mathbf{- 0 . 5}$ recursively.

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio.
We will evaluate and compare $S_{5}$ in 4 different geometric series.

$$
\begin{aligned}
& \# 1: a_{1}=1, r=0.5 \\
& \quad S_{5}=1+0.5+0.25+0.125+0.0625=1.9375
\end{aligned}
$$

$$
\# 2: a_{1}=1, r=-0.5
$$

$$
S_{5}=1+-0.5+0.25+-0.125+0.0625
$$

The first term is $\mathbf{1}$. Now multiply by $\mathbf{- 0 . 5}$ recursively.

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio.
We will evaluate and compare $S_{5}$ in 4 different geometric series.

$$
\begin{aligned}
& \# 1: a_{1}=1, r=0.5 \\
& \quad S_{5}=1+0.5+0.25+0.125+0.0625=1.9375
\end{aligned}
$$

$$
\# 2: a_{1}=1, r=-0.5
$$

$$
S_{5}=1+-0.5+0.25+-0.125+0.0625=
$$

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio.
We will evaluate and compare $S_{5}$ in 4 different geometric series.

$$
\begin{aligned}
& \# 1: a_{1}=1, r=0.5 \\
& \quad S_{5}=1+0.5+0.25+0.125+0.0625=1.9375 \\
& \# 2: a_{1}=1, r=-0.5 \\
& \quad S_{5}=1+-0.5+0.25+-0.125+0.0625=0.6875
\end{aligned}
$$

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio.
We will evaluate and compare $S_{5}$ in 4 different geometric series.

$$
\begin{aligned}
& \# 1: a_{1}=1, r=0.5 \\
& \quad S_{5}=1+0.5+0.25+0.125+0.0625=1.9375
\end{aligned}
$$

\#2: $\mathrm{a}_{1}=1, \mathrm{r}=-\mathbf{0 . 5}$

$$
S_{5}=1+-0.5+0.25+-0.125+0.0625=0.6875
$$

\#3: $\mathrm{a}_{1}=1, r=2$

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio.
We will evaluate and compare $S_{5}$ in 4 different geometric series.

$$
\begin{aligned}
& \# 1: a_{1}=1, r=0.5 \\
& \quad S_{5}=1+0.5+0.25+0.125+0.0625=1.9375 \\
& \# 2: a_{1}=1, r=-0.5 \\
& \quad S_{5}=1+-0.5+0.25+-0.125+0.0625=0.6875
\end{aligned}
$$

$$
\# 3: a_{1}=1, r=2
$$

$$
S_{5}=
$$

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio.
We will evaluate and compare $S_{5}$ in 4 different geometric series.

$$
\begin{aligned}
& \# 1: a_{1}=1, r=0.5 \\
& S_{5}=1+0.5+0.25+0.125+0.0625=1.9375 \\
& \# 2: a_{1}=1, r=-0.5 \\
& S_{5}=1+-0.5+0.25+-0.125+0.0625=0.6875 \\
& \# 3: \\
& a_{1}=1, r=2 \\
& \quad S_{5}=1
\end{aligned}
$$

The first term is 1.

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio.
We will evaluate and compare $S_{5}$ in 4 different geometric series.

$$
\begin{aligned}
& \# 1: a_{1}=1, r=0.5 \\
& S_{5}=1+0.5+0.25+0.125+0.0625=1.9375 \\
& \# 2: a_{1}=1, r=-0.5 \\
& S_{5}=1+-0.5+0.25+-0.125+0.0625=0.6875 \\
& \# 3: a_{1}=1, r=2 \\
& S_{5}=1
\end{aligned}
$$

The first term is 1 . Now multiply by 2 recursively.

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio.
We will evaluate and compare $S_{5}$ in 4 different geometric series.

$$
\begin{aligned}
& \# 1: a_{1}=1, r=0.5 \\
& \quad S_{5}=1+0.5+0.25+0.125+0.0625=1.9375 \\
& \# 2: a_{1}=1, r=-0.5 \\
& \quad S_{5}=1+-0.5+0.25+-0.125+0.0625=0.6875
\end{aligned}
$$

$$
\# 3: a_{1}=1, r=2
$$

$$
S_{5}=1+2
$$

The first term is 1 . Now multiply by 2 recursively.

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio.
We will evaluate and compare $S_{5}$ in 4 different geometric series.

$$
\begin{aligned}
& \# 1: a_{1}=1, r=0.5 \\
& \quad S_{5}=1+0.5+0.25+0.125+0.0625=1.9375 \\
& \# 2: a_{1}=1, r=-0.5 \\
& \quad S_{5}=1+-0.5+0.25+-0.125+0.0625=0.6875
\end{aligned}
$$

$$
\# 3: a_{1}=1, r=2
$$

$$
S_{5}=1+2+4
$$

The first term is 1 . Now multiply by 2 recursively.

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio.
We will evaluate and compare $S_{5}$ in 4 different geometric series.

$$
\begin{aligned}
& \# 1: a_{1}=1, r=0.5 \\
& \quad S_{5}=1+0.5+0.25+0.125+0.0625=1.9375 \\
& \# 2: a_{1}=1, r=-0.5 \\
& \quad S_{5}=1+-0.5+0.25+-0.125+0.0625=0.6875
\end{aligned}
$$

$$
\# 3: a_{1}=1, r=2
$$

$$
S_{5}=1+2+4+8
$$

The first term is 1 . Now multiply by 2 recursively.

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio.
We will evaluate and compare $S_{5}$ in 4 different geometric series.

$$
\begin{aligned}
& \# 1: a_{1}=1, r=0.5 \\
& \quad S_{5}=1+0.5+0.25+0.125+0.0625=1.9375 \\
& \# 2: a_{1}=1, r=-0.5 \\
& \quad S_{5}=1+-0.5+0.25+-0.125+0.0625=0.6875
\end{aligned}
$$

$$
\# 3: a_{1}=1, r=2
$$

$$
S_{5}=1+2+4+8+16
$$

The first term is 1 . Now multiply by 2 recursively.

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio.
We will evaluate and compare $S_{5}$ in 4 different geometric series.

$$
\begin{aligned}
& \# 1: a_{1}=1, r=0.5 \\
& \quad S_{5}=1+0.5+0.25+0.125+0.0625=1.9375 \\
& \# 2: a_{1}=1, r=-0.5 \\
& \quad S_{5}=1+-0.5+0.25+-0.125+0.0625=0.6875
\end{aligned}
$$

$$
\# 3: a_{1}=1, r=2
$$

$$
S_{5}=1+2+4+8+16=
$$

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
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& \quad S_{5}=1+-0.5+0.25+-0.125+0.0625=0.6875
\end{aligned}
$$

$$
\# 3: a_{1}=1, r=2
$$

$$
S_{5}=1+2+4+8+16=31
$$

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio.
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$$
\begin{aligned}
& \# 1: a_{1}=1, r=0.5 \\
& \quad S_{5}=1+0.5+0.25+0.125+0.0625=1.9375
\end{aligned}
$$

\#2: $\mathrm{a}_{1}=1, \mathrm{r}=-\mathbf{0 . 5}$

$$
S_{5}=1+-0.5+0.25+-0.125+0.0625=0.6875
$$

\#3: $\mathrm{a}_{1}=1, \mathrm{r}=2$

$$
S_{5}=1+2+4+8+16=31
$$

\#4: $a_{1}=1, r=-2$

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio.
We will evaluate and compare $S_{5}$ in 4 different geometric series.

$$
\begin{aligned}
& \# 1: a_{1}=1, r=0.5 \\
& S_{5}=1+0.5+0.25+0.125+0.0625=1.9375 \\
& \# 2: a_{1}=1, r=-0.5 \\
& S_{5}=1+-0.5+0.25+-0.125+0.0625=0.6875 \\
& \# 3: a_{1}=1, r=2 \\
& \quad S_{5}=1+2+4+8+16=31
\end{aligned}
$$

$$
\begin{gathered}
\# 4: a_{1}=1, r=-2 \\
S_{5}=
\end{gathered}
$$

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio.
We will evaluate and compare $S_{5}$ in 4 different geometric series.

$$
\begin{aligned}
& \# 1: a_{1}=1, r=0.5 \\
& S_{5}=1+0.5+0.25+0.125+0.0625=1.9375 \\
& \# 2: a_{1}=1, r=-0.5 \\
& S_{5}=1+-0.5+0.25+-0.125+0.0625=0.6875 \\
& \# 3: a_{1}=1, r=2 \\
& \quad S_{5}=1+2+4+8+16=31
\end{aligned}
$$

$$
\# 4: a_{1}=1, r=-2
$$

$$
S_{5}=1
$$

The first term is 1.

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio.
We will evaluate and compare $S_{5}$ in 4 different geometric series.

$$
\begin{aligned}
& \# 1: a_{1}=1, r=0.5 \\
& S_{5}=1+0.5+0.25+0.125+0.0625=1.9375 \\
& \# 2: a_{1}=1, r=-0.5 \\
& S_{5}=1+-0.5+0.25+-0.125+0.0625=0.6875 \\
& \# 3: a_{1}=1, r=2 \\
& \quad S_{5}=1+2+4+8+16=31
\end{aligned}
$$

\#4: $a_{1}=1, r=-2$

$$
S_{5}=1
$$

The first term is 1 . Now multiply by -2 recursively.

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio.
We will evaluate and compare $S_{5}$ in 4 different geometric series.

$$
\begin{aligned}
& \# 1: a_{1}=1, r=0.5 \\
& \quad S_{5}=1+0.5+0.25+0.125+0.0625=1.9375
\end{aligned}
$$

\#2: $\mathrm{a}_{1}=1, \mathrm{r}=-\mathbf{0 . 5}$

$$
S_{5}=1+-0.5+0.25+-0.125+0.0625=0.6875
$$

\#3: $\mathrm{a}_{1}=1, \mathrm{r}=2$

$$
S_{5}=1+2+4+8+16=31
$$

\#4: $a_{1}=1, r=-2$

$$
S_{5}=\underset{\sim}{1+-2}
$$

The first term is $\mathbf{1}$. Now multiply by $\mathbf{- 2}$ recursively.

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio.
We will evaluate and compare $S_{5}$ in 4 different geometric series.

$$
\begin{aligned}
& \# 1: a_{1}=1, r=0.5 \\
& \quad S_{5}=1+0.5+0.25+0.125+0.0625=1.9375
\end{aligned}
$$

\#2: $a_{1}=1, r=-0.5$

$$
S_{5}=1+-0.5+0.25+-0.125+0.0625=0.6875
$$

\#3: $\mathrm{a}_{1}=1, \mathrm{r}=2$

$$
S_{5}=1+2+4+8+16=31
$$

\#4: $a_{1}=1, r=-2$

$$
S_{5}=1+-2+4
$$

The first term is $\mathbf{1}$. Now multiply by $\mathbf{- 2}$ recursively.

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio.
We will evaluate and compare $S_{5}$ in 4 different geometric series.

$$
\begin{aligned}
& \# 1: a_{1}=1, r=0.5 \\
& \quad S_{5}=1+0.5+0.25+0.125+0.0625=1.9375
\end{aligned}
$$

\#2: $\mathrm{a}_{1}=1, \mathrm{r}=-\mathbf{0 . 5}$

$$
S_{5}=1+-0.5+0.25+-0.125+0.0625=0.6875
$$

\#3: $\mathrm{a}_{1}=1, \mathrm{r}=2$

$$
S_{5}=1+2+4+8+16=31
$$

\#4: $a_{1}=1, r=-2$

$$
S_{5}=1+-2+4+-8
$$

The first term is 1 . Now multiply by -2 recursively.

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio.
We will evaluate and compare $S_{5}$ in 4 different geometric series.

$$
\begin{aligned}
& \# 1: a_{1}=1, r=0.5 \\
& \quad S_{5}=1+0.5+0.25+0.125+0.0625=1.9375
\end{aligned}
$$

\#2: $\mathrm{a}_{1}=1, \mathrm{r}=-0.5$

$$
S_{5}=1+-0.5+0.25+-0.125+0.0625=0.6875
$$

\#3: $\mathrm{a}_{1}=1, \mathrm{r}=2$

$$
S_{5}=1+2+4+8+16=31
$$

\#4: $a_{1}=1, r=-2$

$$
S_{5}=1+-2+4+-8+16
$$

The first term is 1 . Now multiply by $\mathbf{- 2}$ recursively.

## The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio.
We will evaluate and compare $S_{5}$ in 4 different geometric series.

$$
\begin{aligned}
& \# 1: a_{1}=1, r=0.5 \\
& S_{5}=1+0.5+0.25+0.125+0.0625=1.9375 \\
& \# 2: a_{1}=1, r=-0.5 \\
& S_{5}=1+-0.5+0.25+-0.125+0.0625=0.6875 \\
& \# 3: a_{1}=1, r=2 \\
& \quad S_{5}=1+2+4+8+16=31
\end{aligned}
$$

\#4: $a_{1}=1, r=-2$

$$
S_{5}=1+-2+4+-8+16=
$$

## The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
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where $a_{1}$ is the first term and $r$ is the common ratio.
We will evaluate and compare $S_{5}$ in 4 different geometric series.

$$
\begin{aligned}
& \# 1: a_{1}=1, r=0.5 \\
& S_{5}=1+0.5+0.25+0.125+0.0625=1.9375 \\
& \# 2: a_{1}=1, r=-0.5 \\
& S_{5}=1+-0.5+0.25+-0.125+0.0625=0.6875 \\
& \# 3: a_{1}=1, r=2 \\
& \quad S_{5}=1+2+4+8+16=31
\end{aligned}
$$

\#4: $a_{1}=1, r=-2$

$$
S_{5}=1+-2+4+-8+16=11
$$

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio.
We will evaluate and compare $S_{5}$ in 4 different geometric series.

$$
\# 1: a_{1}=1, r=0.5
$$

$$
S_{5}=1+0.5+0.25+0.125+0.0625=1.9375
$$

\#2: $\mathrm{a}_{1}=1, \mathrm{r}=-0.5$

$$
S_{5}=1+-0.5+0.25+-0.125+0.0625=0.6875
$$

\#3: $\mathrm{a}_{1}=1, \mathrm{r}=2$

$$
S_{5}=1+2+4+8+16=31
$$

\#4: $a_{1}=1, r=-2$

$$
S_{5}=1+-2+4+-8+16=11
$$

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio.
We will evaluate and compare $S_{5}$ in 4 different geometric series.

$$
\begin{aligned}
& \# 1: a_{1}=1, r=0.5 \\
& \quad S_{5}=1+0.5+0.25+0.125+0.0625=1.9375
\end{aligned}
$$

\#2: $\mathrm{a}_{1}=1, \mathrm{r}=\mathbf{- 0 . 5}$

$$
S_{5}=1+-0.5+0.25+-0.125+0.0625=0.6875
$$

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
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We will evaluate and compare $S_{5}$ in 4 different geometric series.

$$
\begin{aligned}
& \# 1: a_{1}=1, r=0.5 \\
& \quad S_{5}=1+0.5+0.25+0.125+0.0625=1.9375
\end{aligned}
$$

\#2: $a_{1}=1, r=-0.5$

$$
S_{5}=1+-0.5+0.25+-0.125+0.0625=0.6875
$$

In these two examples, $|\mathrm{r}|<1$.

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio.
We will evaluate and compare $S_{5}$ in 4 different geometric series.

$$
\begin{aligned}
& \# 1: a_{1}=1, r=0.5 \\
& \quad S_{5}=1+0.5+0.25+0.125+0.0625=1.9375
\end{aligned}
$$

\#2: $\mathrm{a}_{1}=1, \mathrm{r}=-\mathbf{0 . 5}$

$$
S_{5}=1+-0.5+0.25+-0.125+0.0625=0.6875
$$

In these two examples, $|r|<1$. Because of this, each successive term is closer to 0 than the one before it.

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
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where $a_{1}$ is the first term and $r$ is the common ratio.
We will evaluate and compare $S_{5}$ in 4 different geometric series.

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\begin{aligned}
& \# 1: a_{1}=1, r=0.5 \\
& \quad S_{5}=1+0.5+0.25+0.125+0.0625=1.9375
\end{aligned}
$$

\#2: $\mathrm{a}_{1}=1, \mathrm{r}=-\mathbf{0 . 5}$

$$
S_{5}=1+-0.5+0.25+-0.125+0.0625=0.6875
$$

In these two examples, $|r|<1$. Because of this, each successive term is closer to 0 than the one before it. Series like these are called converging.

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio.
We will evaluate and compare $S_{5}$ in 4 different geometric series.

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\begin{aligned}
& \# 1: a_{1}=1, r=0.5 \\
& \quad S_{5}=1+0.5+0.25+0.125+0.0625=1.9375
\end{aligned}
$$

\#2: $\mathrm{a}_{1}=1, \mathrm{r}=-\mathbf{0 . 5}$

$$
S_{5}=1+-0.5+0.25+-0.125+0.0625=0.6875
$$

In these two examples, $|r|<1$. Because of this, each successive term is closer to 0 than the one before it. Series like these are called converging. As n increases,

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio.
We will evaluate and compare $S_{5}$ in 4 different geometric series.

$$
\begin{aligned}
& \# 1: a_{1}=1, r=0.5 \\
& \quad S_{5}=1+0.5+0.25+0.125+0.0625=1.9375
\end{aligned}
$$

\#2: $\mathrm{a}_{1}=1, \mathrm{r}=-\mathbf{0 . 5}$

$$
S_{5}=1+-0.5+0.25+-0.125+0.0625=0.6875
$$

In these two examples, $|r|<1$. Because of this, each successive term is closer to 0 than the one before it. Series like these are called converging. As $\mathbf{n}$ increases, these terms in the formula approach $\mathbf{0}$,

## The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio.
We will evaluate and compare $S_{5}$ in 4 different geometric series.

$$
\begin{aligned}
& \# 1: a_{1}=1, r=0.5 \\
& \quad S_{5}=1+0.5+0.25+0.125+0.0625=1.9375
\end{aligned}
$$

\#2: $a_{1}=1, r=-0.5$

$$
S_{5}=1+-0.5+0.25+-0.125+0.0625=0.6875
$$

In these two examples, $|r|<1$. Because of this, each successive term is closer to 0 than the one before it. Series like these are called converging. As $\mathbf{n}$ increases, these terms in the formula approach 0 , and $S_{n}$ approaches a specific number, $S$, as a limiting value

## The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
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where $a_{1}$ is the first term and $r$ is the common ratio.
We will evaluate and compare $S_{5}$ in 4 different geometric series.

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\begin{aligned}
& \# 1: a_{1}=1, r=0.5 \\
& \quad S_{5}=1+0.5+0.25+0.125+0.0625=1.9375
\end{aligned}
$$

\#2: $\mathrm{a}_{1}=1, \mathrm{r}=-\mathbf{0 . 5}$

$$
S_{5}=1+-0.5+0.25+-0.125+0.0625=0.6875
$$

In these two examples, $|r|<1$. Because of this, each successive term is closer to 0 than the one before it. Series like these are called converging. As $\mathbf{n}$ increases, these terms in the formula approach 0 , and $S_{n}$ approaches a specific number, $S$, as a limiting value where

$$
S=\frac{a_{1}}{1-\mathbf{r}}
$$

## The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio.
We will evaluate and compare $S_{5}$ in 4 different geometric series.

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\begin{aligned}
& \# 1: a_{1}=1, r=0.5 \\
& \quad S_{5}=1+0.5+0.25+0.125+0.0625=1.9375
\end{aligned}
$$

\#2: $\mathrm{a}_{1}=1, \mathrm{r}=-0.5$

$$
S_{5}=1+-0.5+0.25+-0.125+0.0625=0.6875
$$

In these two examples, $|r|<1$. Because of this, each successive term is closer to 0 than the one before it. Series like these are called converging. As $\mathbf{n}$ increases, these terms in the formula approach 0 , and $S_{n}$ approaches a specific number, $S$, as a limiting value where

$$
\text { If }|r|<1, \text { then } S=\frac{a_{1}}{1-r}
$$

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio.
$\# 1: a_{1}=1, r=0.5$

$$
S_{5}=1+0.5+0.25+0.125+0.0625=1.9375
$$

\#2: $\mathrm{a}_{1}=1, \mathrm{r}=-\mathbf{0 . 5}$

$$
S_{5}=1+-0.5+0.25+-0.125+0.0625=0.6875
$$

$$
\text { If }|r|<1, \text { then } S=\frac{a_{1}}{1-r}
$$

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio. We will calculate $S_{20}$ and $S$ for these two series.

$$
\begin{aligned}
& \# 1: a_{1}=1, r=0.5 \\
& \quad S_{5}=1+0.5+0.25+0.125+0.0625=1.9375
\end{aligned}
$$

\#2: $\mathrm{a}_{1}=1, \mathrm{r}=\mathbf{- 0 . 5}$

$$
S_{5}=1+-0.5+0.25+-0.125+0.0625=0.6875
$$

$$
\text { If }|r|<1, \text { then } S=\frac{a_{1}}{1-r}
$$

The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio. We will calculate $S_{20}$ and $S$ for these two series.

$$
\begin{aligned}
& \# 1: a_{1}=1, r=0.5 \\
& \quad S_{5}=1+0.5+0.25+0.125+0.0625=1.9375
\end{aligned}
$$

\#2: $\mathrm{a}_{1}=1, \mathrm{r}=-0.5$

$$
S_{5}=1+-0.5+0.25+-0.125+0.0625=0.6875
$$

$$
\text { If }|r|<1, \text { then } S=\frac{a_{1}}{1-r}
$$

## The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio. We will calculate $S_{20}$ and $S$ for these two series.

$$
\begin{aligned}
& \# 1: a_{1}=1, r=0.5 \\
& \quad S_{5}=1+0.5+0.25+0.125+0.0625=1.9375 \\
& S_{20}= \\
& \# 2: a_{1}=1, r=-0.5 \\
& \quad S_{5}=1+-0.5+0.25+-0.125+0.0625=0.6875
\end{aligned}
$$

$$
\text { If }|r|<1, \text { then } S=\frac{a_{1}}{1-r}
$$

## The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

where $a_{1}$ is the first term and $r$ is the common ratio. We will calculate $S_{20}$ and $S$ for these two series.

$$
\begin{aligned}
\# 1: & a_{1}=1, r=0.5 \\
& S_{5}=1+0.5+0.25+0.125+0.0625=1.9375 \\
S_{20}= & \underline{1( }
\end{aligned}
$$

\#2: $\mathrm{a}_{1}=1, \mathrm{r}=-0.5$

$$
S_{5}=1+-0.5+0.25+-0.125+0.0625=0.6875
$$

$$
\text { If }|r|<1, \text { then } S=\frac{a_{1}}{1-r}
$$

## The sum of the first $\mathbf{n}$ terms of a geometric series is

$$
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where $a_{1}$ is the first term and $r$ is the common ratio. We will calculate $S_{20}$ and $S$ for these two series.

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\#2: $\mathrm{a}_{1}=1, \mathrm{r}=-0.5$

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If $|r|<1$, then $S=\frac{a_{1}}{1-r}$

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We will evaluate and compare $S_{5}$ in $\mathbf{4}$ different geometric series.

$$
\begin{aligned}
& \# 3: a_{1}=1, r=2 \\
& S_{5}=1+2+4+8+16=31 \\
& \# 4: a_{1}=1, r=-2 \\
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In these two examples, $|\mathbf{r}|>1$.

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where $a_{1}$ is the first term and $r$ is the common ratio.
We will evaluate and compare $S_{5}$ in $\mathbf{4}$ different geometric series.

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\begin{aligned}
& \# 3: a_{1}=1, r=2 \\
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In these two examples, $|r|>1$. Because of this, each successive term is further from 0 than the one before it.

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S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \quad \text { or } \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
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where $a_{1}$ is the first term and $r$ is the common ratio.
We will calculate $S_{19}$ and $S_{20}$ for these two series.

$$
\# 3: a_{1}=1, r=2
$$

$$
S_{5}=1+2+4+8+16=31
$$

$$
S_{19}=\frac{1\left(1-2^{19}\right)}{1-2}=524,287 \quad S_{20}=\frac{1\left(1-2^{20}\right)}{1-2}=1,048,575
$$

\#4: $\mathrm{a}_{1}=1, r=-2$

$$
\begin{gathered}
S_{5}=1+-2+4+-8+16=11 \\
S_{19}=\frac{1\left[1-(-2)^{19}\right]}{1--2}=174,763 \quad S_{20}=\frac{1\left[1-(-2)^{20}\right]}{1--2}
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In these two examples, $|r|>1$. Because of this, each successive term is further from 0 than the one before it. Series like these are called diverging. As $\mathbf{n}$ increases, the absolute value of $\mathbf{S}_{\mathrm{n}}$ increases as well.

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## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.

1. Find the sum of the first 6 terms of a geometric sequence in which $a_{1}=2$ and $r=3$.
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The series is geometric.

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$$
S_{6}=
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$$

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S_{6}=2\left(1-3^{6}\right)
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The first term is -3.

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$$
a_{1}=(-3)^{1}=-3 \quad a_{2}=(-3)^{2}=9
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$$

The first term is $\mathbf{- 3}$. Then multiply by $\mathbf{- 3}$ recursively.

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\begin{array}{lll}
a_{1}=(-3)^{1}=-3 & a_{2}=(-3)^{2}=9 & a_{3}=(-3)^{3}=-27 \\
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The first term is $\mathbf{- 3}$. Then multiply by $\mathbf{- 3}$ recursively.

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.

1. Find the sum of the first 6 terms of a geometric sequence in which $a_{1}=2$ and $r=3$.

$$
n=6
$$

The series is geometric. $\longmapsto S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r}$

$$
\begin{gathered}
S_{6}=\frac{2\left(1-3^{6}\right)}{1-3}=\frac{-1,456}{-2} \\
S_{6}=728
\end{gathered}
$$

2. Find the sum of the first 10 terms of the sequence defined by $a_{n}=(-3)^{n}$.

$$
\begin{array}{lll}
a_{1}=(-3)^{1}=-3 & a_{2}=(-3)^{2}=9 & a_{3}=(-3)^{3}=-27 \\
\text { The series is geometric. } \Longleftrightarrow & S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r}
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S_{10}=\frac{-3\left[1-(-3)^{10}\right]}{1--3}=\frac{177,144}{4}
$$

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\begin{gathered}
S_{10}=\frac{-3\left[1-(-3)^{10}\right]}{1--3}=\frac{177,144}{4} \\
S_{10}=44,286
\end{gathered}
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## Algebra 2 Class Worksheet \#6 Unit 9

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## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
3. Find the sum of the first 7 terms of the sequence defined by $a_{n+1}=0.4 a_{n}$ where $a_{1}=125$.
4. Find the sum of the first 8 terms of the sequence $7,14,28,56, \ldots$

## Algebra 2 Class Worksheet \#6 Unit 9

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3. Find the sum of the first 7 terms of the sequence defined by $a_{n+1}=0.4 a_{n}$ where $a_{1}=125$.

$$
\mathrm{n}=7
$$

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
3. Find the sum of the first 7 terms of the sequence defined by $a_{n+1}=0.4 a_{n}$ where $a_{1}=125$.

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## Algebra 2 Class Worksheet \#6 Unit 9

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## Algebra 2 Class Worksheet \#6 Unit 9

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3. Find the sum of the first 7 terms of the sequence defined
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$\mathrm{n}=7$

The first term is $\mathbf{1 2 5}$.

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
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Solve each of the following problems.
3. Find the sum of the first 7 terms of the sequence defined by $a_{n+1}=0.4 a_{n}$ where $a_{1}=125$.
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The first term is 125 . Then multiply by 0.4 recursively.

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
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by $a_{n+1}=0.4 a_{n}$ where $a_{1}=125$.
$\mathrm{n}=7$
$r=0.4$
The first term is 125 . Then multiply by 0.4 recursively.

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
3. Find the sum of the first 7 terms of the sequence defined by $a_{n+1}=0.4 a_{n}$ where $a_{1}=125$.
$n=7 \quad$ The series is geometric.
$r=0.4$
The first term is 125 . Then multiply by 0.4 recursively.

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
3. Find the sum of the first 7 terms of the sequence defined by $a_{n+1}=0.4 a_{n}$ where $a_{1}=125$.

$$
\begin{gathered}
\mathrm{n}=7 \\
\mathrm{r}=0.4
\end{gathered} \quad \text { The series is geometric. }
$$

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3. Find the sum of the first 7 terms of the sequence defined by $a_{n+1}=0.4 a_{n}$ where $a_{1}=125$.

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n=7 \quad \text { The series is geometric. } \longmapsto S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r}
$$

$$
r=0.4
$$

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\begin{array}{r}
\mathrm{n}=7 \\
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\end{array}
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The series is geometric.

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S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r}
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\hline \mathbf{1 2 5 (}
\end{array}
$$

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S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r}
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\begin{array}{cc}
\mathrm{n}=7 & \text { The series is geometric. } \\
\mathbf{r}=0.4 & \mathrm{~S}_{7}=\mathbf{1 2 5 ( 1 - 0 . 4 ^ { 7 } )}
\end{array}
$$

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\begin{array}{cc}
\mathrm{n}=7 & \text { The series is geometric. } \\
\mathrm{r}=0.4 & \mathrm{~S}_{7}=\frac{125\left(1-0.4^{7}\right)}{1-0.4}
\end{array}
$$

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r}
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## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
3. Find the sum of the first 7 terms of the sequence defined by $a_{n+1}=0.4 a_{n}$ where $a_{1}=125$.

$$
\text { The series is geometric. } \longmapsto S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r}
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\begin{array}{cc}
\begin{array}{c}
\mathrm{n}=7 \\
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The first term is 7.

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The first term is 7. Then multiply by 2 recursively.

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$$
n=8
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$$
r=2
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The first term is 7. Then multiply by 2 recursively.

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& \mathrm{n}=8 \\
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The series is geometric.

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\begin{aligned}
& a_{1}=7 \\
& r=2
\end{aligned}
$$

$$
\mathbf{S}_{8}=
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\begin{array}{r}
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\mathrm{n}=8 & \text { The series is geometric. } \longmapsto \\
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& \begin{array}{c}
\text { by } a_{n+1}=0.4 a_{n} \\
\begin{array}{c}
n=7 \\
r=0.4
\end{array} \\
\text { where } a_{1}=125 . \\
\text { The series is geometric. } \Rightarrow S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \\
S_{7}=\frac{125\left(1-0.4^{7}\right)}{1-0.4} \approx \frac{124.8}{0.6} \Rightarrow S_{7} \approx 208
\end{array}
\end{aligned}
$$

4. Find the sum of the first 8 terms of the sequence $7,14,28,56, \ldots$

$$
\begin{array}{rr}
\mathrm{n}=8 & \text { The series is geometric. } \Rightarrow \mathrm{S}_{\mathrm{n}}=\frac{\mathrm{a}_{1}\left(1-\mathrm{r}^{\mathrm{n}}\right)}{1-\mathrm{r}} \\
\mathrm{a}_{1}=7 \\
\mathrm{r}=2 & \mathrm{~S}_{8}=\frac{7\left(1-2^{8}\right)}{1-2}=\frac{-1785}{-1} \Rightarrow \mathrm{~S}_{8}=
\end{array}
$$

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
3. Find the sum of the first 7 terms of the sequence defined

$$
\begin{aligned}
& \begin{array}{c}
\text { by } a_{n+1}=0.4 a_{n} \\
\begin{array}{c}
n=7 \\
r=0.4
\end{array} \\
\text { where } a_{1}=125 . \\
\text { The series is geometric. } \Rightarrow S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \\
S_{7}=\frac{125\left(1-0.4^{7}\right)}{1-0.4} \approx \frac{124.8}{0.6} \Rightarrow S_{7} \approx 208
\end{array}
\end{aligned}
$$

4. Find the sum of the first 8 terms of the sequence $7,14,28,56, \ldots$

$$
\begin{array}{rr}
\mathrm{n}=8 & \text { The series is geometric. } \Rightarrow \mathrm{S}_{\mathrm{n}}=\frac{\mathrm{a}_{1}\left(1-\mathrm{r}^{\mathrm{n}}\right)}{1-\mathrm{r}} \\
\mathrm{a}_{1}=7 \\
\mathrm{r}=2 & \mathrm{~S}_{8}=\frac{7\left(1-2^{8}\right)}{1-2}=\frac{-1785}{-1} \Rightarrow \mathrm{~S}_{8}=1785
\end{array}
$$

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
3. Find the sum of the first 7 terms of the sequence defined

$$
\begin{aligned}
& \begin{array}{c}
\text { by } a_{n+1}=0.4 a_{n} \\
\begin{array}{c}
n=7 \\
r=0.4
\end{array} \\
\text { where } a_{1}=125 . \\
\text { The series is geometric. } \Rightarrow S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \\
S_{7}=\frac{125\left(1-0.4^{7}\right)}{1-0.4} \approx \frac{124.8}{0.6} \Rightarrow S_{7} \approx 208
\end{array}
\end{aligned}
$$

4. Find the sum of the first 8 terms of the sequence $7,14,28,56, \ldots$

$$
\begin{array}{rr}
\mathrm{n}=8 & \text { The series is geometric. } \longmapsto \\
\mathrm{a}_{1}=7 & \mathrm{~S}_{\mathrm{n}}=\frac{\mathrm{a}_{1}\left(1-\mathrm{r}^{\mathrm{n}}\right)}{1-\mathrm{r}} \\
\mathrm{r}=2 & \mathrm{~S}_{8}=\frac{7\left(1-2^{8}\right)}{1-2}=\frac{-1785}{-1} \Rightarrow \mathrm{~S}_{8}=1785
\end{array}
$$

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
3. Find the sum of the first 7 terms of the sequence defined by $a_{n+1}=0.4 a_{n}$ where $a_{1}=125$.

$$
\begin{array}{ll}
\begin{array}{c}
n=7 \\
r=0.4
\end{array} & \text { The series is geometric. } \longmapsto S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r} \\
& S_{7}=\frac{125\left(1-0.4^{7}\right)}{1-0.4} \approx \frac{124.8}{0.6} \Rightarrow S_{7} \approx 208
\end{array}
$$

4. Find the sum of the first 8 terms of the sequence $7,14,28,56, \ldots$

$$
\begin{array}{rr}
\mathrm{n}=8 & \text { The series is geometric. } \longrightarrow \mathrm{S}_{\mathrm{n}}=\frac{\mathrm{a}_{1}\left(1-\mathrm{r}^{\mathrm{n}}\right)}{1-\mathrm{r}} \\
\mathrm{a}_{1}=7 \\
\mathrm{r}=2 & \mathrm{~S}_{8}=\frac{7\left(1-2^{8}\right)}{1-2}=\frac{-1785}{-1} \Rightarrow \mathrm{~S}_{8}=1785
\end{array}
$$

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
5. Evaluate the series $5-10+20-40+\ldots+1280$.
6. Evaluate the infinite series $10+2+0.4+0.08+\ldots$

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
5. Evaluate the series $5-10+20-40+\ldots+1280$.
6. Evaluate the infinite series $10+2+0.4+0.08+\ldots$

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
5. Evaluate the series $5-10+20-40+\ldots+1280$.

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
5. Evaluate the series $5-10+20-40+\ldots+1280$.

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
5. Evaluate the series 5-10+20-40+... +1280 .

The first term is 5 .

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
5. Evaluate the series $5-10+20-40+\ldots+1280$.

$$
a_{1}=5
$$

The first term is 5.

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
5. Evaluate the series $5-10+20-40+\ldots+1280$.

$$
a_{1}=5
$$

The first term is 5 . Then multiply by $\mathbf{- 2}$ recursively.

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
5. Evaluate the series $5-10+20-40+\ldots+1280$. $a_{1}=5$

The first term is 5 . Then multiply by $\mathbf{- 2}$ recursively.

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
5. Evaluate the series $5-10+20-40+\ldots+1280$. $a_{1}=5$

The first term is 5 . Then multiply by $\mathbf{- 2}$ recursively.

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
5. Evaluate the series $5-10+20-40+\ldots+1280$. $a_{1}=5$

The first term is 5 . Then multiply by $\mathbf{- 2}$ recursively.

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
5. Evaluate the series $5-10+20-40+\ldots+1280$.

$$
a_{1}=5
$$

The first term is 5 . Then multiply by $\mathbf{- 2}$ recursively.

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
5. Evaluate the series $5-10+20-40+\ldots+1280$.
$a_{1}=5$
The series is geometric.

The first term is 5 . Then multiply by $\mathbf{- 2}$ recursively.

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
5. Evaluate the series $5-10+20-40+\ldots+1280$.
$a_{1}=5$
$r=-2$

The series is geometric.

The first term is 5 . Then multiply by -2 recursively.

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
5. Evaluate the series $5-10+20-40+\ldots+1280$.
$a_{1}=5 \quad$ The series is geometric.
$r=-2$

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
5. Evaluate the series $5-10+20-40+\ldots+1280$.

$$
\begin{aligned}
& a_{1}=5 \\
& \hline r=-2
\end{aligned}
$$

The series is geometric.

$$
S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
5. Evaluate the series $5-10+20-40+\ldots+1280$.

$$
\begin{aligned}
& a_{1}=5 \\
& r=-2
\end{aligned}
$$

The series is geometric.

$$
S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
5. Evaluate the series $5-10+20-40+\ldots+1280$.

$$
\begin{aligned}
& a_{1}=5 \\
& r=-2 \\
& a_{n}=
\end{aligned} \quad \text { The series is geometric. } \longmapsto S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
5. Evaluate the series $5-10+20-40+\ldots+1280$.

$$
\begin{aligned}
a_{1} & =5 \\
r & =-2 \\
a_{n} & =1280
\end{aligned} \quad \text { The series is geometric. } \longmapsto S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
5. Evaluate the series $5-10+20-40+\ldots+1280$.
$a_{1}=5$
The series is geometric.

$$
S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

$$
r=-2
$$

$$
a_{n}=1280
$$

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
5. Evaluate the series $5-10+20-40+\ldots+1280$.

$$
\begin{aligned}
a_{1} & =5 \\
r & =-2 \\
a_{n} & =1280
\end{aligned}
$$

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
5. Evaluate the series $5-10+20-40+\ldots+1280$.

$$
\begin{aligned}
& a_{1}=5 \\
& r=-2 \\
& a_{n}=1280 \\
& \hline
\end{aligned}
$$

The series is geometric.

$$
S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

$$
S_{n}=
$$

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
5. Evaluate the series $5-10+20-40+\ldots+1280$.

$$
\begin{aligned}
& a_{1}=5 \\
& r=-2 \\
& a_{n}=1280 \\
& \hline
\end{aligned}
$$

The series is geometric.

$$
S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

$$
S_{n}=\frac{5}{}
$$

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
5. Evaluate the series $5-10+20-40+\ldots+1280$.

$$
\begin{aligned}
a_{1} & =5 \\
r & =-2 \\
a_{n} & =1280
\end{aligned}
$$

The series is geometric.

$$
S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

$$
S_{n}=\frac{5-}{}
$$

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
5. Evaluate the series $5-10+20-40+\ldots+1280$.

$$
\begin{aligned}
a_{1} & =5 \\
r & =-2 \\
a_{n} & =1280
\end{aligned}
$$

The series is geometric.

$$
S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

$$
S_{n}=\frac{5--2( }{}
$$

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
5. Evaluate the series $5-10+20-40+\ldots+1280$.

$$
\begin{aligned}
a_{1} & =5 \\
r & =-2 \\
a_{n} & =1280
\end{aligned}
$$

The series is geometric.

$$
S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

$$
S_{n}=\frac{5--2(1280)}{}
$$

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
5. Evaluate the series $5-10+20-40+\ldots+1280$.

$$
\begin{aligned}
a_{1} & =5 \\
r & =-2 \\
a_{n} & =1280
\end{aligned}
$$

The series is geometric.

$$
S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

$$
S_{n}=\frac{5--2(1280)}{1--2}
$$

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
5. Evaluate the series $5-10+20-40+\ldots+1280$.

$$
\begin{array}{ll}
a_{1}=5 & \text { The series is geometric. } \\
r=-2 & \\
a_{n}=1280 & S_{n}=\frac{5--2(1280)}{1--2}=
\end{array}
$$

$S_{n}=\frac{a_{1}-r a_{n}}{1-r}$

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
5. Evaluate the series $5-10+20-40+\ldots+1280$.

$$
a_{1}=5 \quad \text { The series is geometric. } \longmapsto \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

$$
r=-2
$$

$$
a_{n}=1280
$$

$$
S_{n}=\frac{5--2(1280)}{1--2}=\underline{2565}
$$

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
5. Evaluate the series $5-10+20-40+\ldots+1280$.

$$
\begin{array}{ll}
a_{1}=5 & \text { The series is geometric. } \longrightarrow \\
r=-2 & S_{n}=\frac{a_{1}-r a_{n}}{1-r} \\
a_{n}=1280 & S_{n}=\frac{5--2(1280)}{1--2}=\frac{2565}{3}
\end{array}
$$

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
5. Evaluate the series $5-10+20-40+\ldots+1280$.

$$
a_{1}=5 \quad \text { The series is geometric. } \longmapsto \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

$$
r=-2
$$

$$
a_{n}=1280
$$

$\mathrm{a}_{\mathrm{n}}=\mathbf{1 2 8 0}$

$$
S_{n}=\frac{5--2(1280)}{1--2}=\frac{2565}{3} \Rightarrow
$$

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
5. Evaluate the series $5-10+20-40+\ldots+1280$.

$$
a_{1}=5 \quad \text { The series is geometric. } \longmapsto \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

$$
r=-2
$$

$$
a_{n}=1280
$$

$$
S_{n}=\frac{5--2(1280)}{1--2}=\frac{2565}{3} \Rightarrow S_{n}=
$$

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
5. Evaluate the series $5-10+20-40+\ldots+1280$.

$$
\begin{array}{ll}
\begin{array}{ll}
a_{1}=5 \\
r=-2
\end{array} & \text { The series is geometric. } \longrightarrow \\
a_{n}=1280 & S_{n}=\frac{a_{1}-r a_{n}}{1-r} \\
1-2(1280) \\
1-2565 \\
3 & S_{n}=855
\end{array}
$$

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
5. Evaluate the series $5-10+20-40+\ldots+1280$.

$$
\begin{array}{ll}
\begin{array}{ll}
a_{1}=5 \\
r=-2
\end{array} & \text { The series is geometric. } \Rightarrow \\
a_{n}=1280 & S_{n}=\frac{a_{1}-r a_{n}}{1-r} \\
1--2 & =\frac{5565}{3} \Rightarrow S_{n}=855
\end{array}
$$

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
5. Evaluate the series $5-10+20-40+\ldots+1280$.

$$
\begin{array}{ll}
\begin{array}{l}
a_{1}=5 \\
r=-2
\end{array} & \text { The series is geometric. } \square \\
a_{n}=1280 & S_{n}=\frac{a_{1}-r a_{n}}{1-r} \\
1--2 & =\frac{5565}{3} \Rightarrow S_{n}=855
\end{array}
$$

6. Evaluate the infinite series $10+2+0.4+0.08+\ldots$

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
5. Evaluate the series $5-10+20-40+\ldots+1280$.

$$
\begin{array}{ll}
\begin{array}{l}
a_{1}=5 \\
r=-2
\end{array} & \text { The series is geometric. } \Rightarrow \\
a_{n}=1280 & S_{n}=\frac{a_{1}-r a_{n}}{1-r} \\
1--2 & =\frac{5--2(1280)}{3} \Rightarrow S_{n}=855
\end{array}
$$

6. Evaluate the infinite series $10+2+0.4+0.08+\ldots$

The first term is $\mathbf{1 0}$.

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
5. Evaluate the series $5-10+20-40+\ldots+1280$.

$$
\begin{array}{ll}
\begin{array}{ll}
a_{1}=5 \\
r=-2
\end{array} & \text { The series is geometric. } \Rightarrow \\
a_{n}=1280 & S_{n}=\frac{a_{1}-r a_{n}}{1-r} \\
1--2 & =\frac{5565}{3} \Rightarrow S_{n}=855
\end{array}
$$

6. Evaluate the infinite series $10+2+0.4+0.08+\ldots$

$$
a_{1}=10
$$

The first term is $\mathbf{1 0}$.

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
5. Evaluate the series $5-10+20-40+\ldots+1280$.

$$
\begin{array}{ll}
\begin{array}{ll}
a_{1}=5 \\
r & =-2
\end{array} & \text { The series is geometric. } \longrightarrow \\
a_{n}=1280 & S_{n}=\frac{a_{1}-r a_{n}}{1-r} \\
1--2 & =\frac{5565}{3} \Rightarrow S_{n}=855
\end{array}
$$

6. Evaluate the infinite series $10+2+0.4+0.08+\ldots$

$$
a_{1}=10
$$

The first term is 10 . Then multiply by 0.2 recursively.

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
5. Evaluate the series $5-10+20-40+\ldots+1280$.

$$
\begin{array}{ll}
\begin{array}{l}
a_{1}=5 \\
r=-2
\end{array} & \text { The series is geometric. } \longrightarrow \\
a_{n}=1280 & S_{n}=\frac{a_{1}-r a_{n}}{1-r} \\
1--2 & =\frac{5565}{3} \Rightarrow S_{n}=855
\end{array}
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$$

The first term is 10 . Then multiply by 0.2 recursively.

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\begin{array}{ll}
\begin{array}{ll}
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r=-2
\end{array} & \text { The series is geometric. } \longrightarrow \\
a_{n}=1280 & S_{n}=\frac{a_{1}-r a_{n}}{1-r} \\
1--2 & =\frac{5565}{3} \Rightarrow S_{n}=855
\end{array}
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\begin{array}{ll}
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a_{1}=5 \\
r=-2
\end{array} & \text { The series is geometric. } \longrightarrow \\
a_{n}=1280 & S_{n}=\frac{a_{1}-r a_{n}}{1-r} \\
1--2 & =\frac{5565}{3} \Rightarrow S_{n}=855
\end{array}
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The first term is 10 . Then multiply by 0.2 recursively.

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\begin{array}{ll}
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r & =-2
\end{array} & \text { The series is geometric. } \longrightarrow \\
a_{n}=1280 & S_{n}=\frac{a_{1}-r a_{n}}{1-r} \\
1--2 & =\frac{5565}{3} \Rightarrow S_{n}=855
\end{array}
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$$
a_{1}=10
$$

The first term is 10 . Then multiply by 0.2 recursively.

## Algebra 2 Class Worksheet \#6 Unit 9

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5. Evaluate the series $5-10+20-40+\ldots+1280$.

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\begin{array}{ll}
\begin{array}{l}
a_{1}=5 \\
r=-2
\end{array} & \text { The series is geometric. } \longrightarrow \\
a_{n}=1280 & S_{n}=\frac{a_{1}-r a_{n}}{1-r} \\
1--2 & =\frac{5565}{3} \Rightarrow S_{n}=855
\end{array}
$$

6. Evaluate the infinite series $10+2+0.4+0.08+\ldots$

$$
\begin{aligned}
& a_{1}=10 \\
& \hline r=0.2
\end{aligned}
$$

The first term is 10 . Then multiply by 0.2 recursively.

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
5. Evaluate the series $5-10+20-40+\ldots+1280$.

$$
\begin{array}{ll}
\begin{array}{ll}
a_{1}=5 \\
r=-2
\end{array} & \text { The series is geometric. } \Rightarrow \\
a_{n}=1280 & S_{n}=\frac{a_{1}-r a_{n}}{1-r} \\
1--2 & =\frac{5565}{3} \Rightarrow S_{n}=855
\end{array}
$$

6. Evaluate the infinite series $10+2+0.4+0.08+\ldots$

$$
\begin{aligned}
& \mathbf{a}_{1}=10 \\
& \mathrm{r}=0.2
\end{aligned}
$$

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
5. Evaluate the series $5-10+20-40+\ldots+1280$.

$$
\begin{array}{ll}
\begin{array}{l}
a_{1}=5 \\
r=-2
\end{array} & \text { The series is geometric. } \longrightarrow \\
a_{n}=1280 & S_{n}=\frac{a_{1}-r a_{n}}{1-r} \\
1--2 & =\frac{5565}{3} \Rightarrow S_{n}=855
\end{array}
$$

6. Evaluate the infinite series $\mathbf{1 0}+\mathbf{2}+\mathbf{0 . 4}+\mathbf{0 . 0 8}+\ldots$

$$
\begin{aligned}
& a_{1}=10 \\
& r=0.2
\end{aligned}
$$

This is an infinite
geometric series.

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
5. Evaluate the series $5-10+20-40+\ldots+1280$.

$$
\begin{array}{ll}
\begin{array}{ll}
a_{1}=5 \\
r=-2
\end{array} & \text { The series is geometric. } \longrightarrow \\
a_{n}=1280 & S_{n}=\frac{a_{1}-r a_{n}}{1-r} \\
1--2 & =\frac{5565}{3} \Rightarrow S_{n}=855
\end{array}
$$

6. Evaluate the infinite series $\mathbf{1 0}+\mathbf{2}+\mathbf{0 . 4}+\mathbf{0 . 0 8}+\ldots$

$$
\begin{aligned}
& a_{1}=10 \\
& \hline r=0.2
\end{aligned}
$$

This is an infinite geometric series. $\Longrightarrow$ If $|\mathbf{r}|<1$,

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
5. Evaluate the series $5-10+20-40+\ldots+1280$.

$$
\begin{array}{ll}
\begin{array}{l}
a_{1}=5 \\
r=-2
\end{array} & \text { The series is geometric. } \longrightarrow \\
a_{n}=1280 & S_{n}=\frac{a_{1}-r a_{n}}{1-r} \\
1--2 & =\frac{5565}{3} \Rightarrow S_{n}=855
\end{array}
$$

6. Evaluate the infinite series $\mathbf{1 0}+\mathbf{2}+\mathbf{0 . 4}+\mathbf{0 . 0 8}+\ldots$

$$
\begin{aligned}
& a_{1}=10 \\
& r=0.2
\end{aligned}
$$

This is an infinite geometric series.
$\Longrightarrow$ If $|r|<1$, then $S=\frac{a_{1}}{1-r}$.

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
5. Evaluate the series $5-10+20-40+\ldots+1280$.

$$
\begin{array}{ll}
\begin{array}{l}
a_{1}=5 \\
r=-2
\end{array} & \text { The series is geometric. } \longrightarrow \\
a_{n}=1280 & S_{n}=\frac{a_{1}-r a_{n}}{1-r} \\
1--2 & =\frac{5565}{3} \Rightarrow S_{n}=855
\end{array}
$$

6. Evaluate the infinite series $\mathbf{1 0}+\mathbf{2}+\mathbf{0 . 4}+\mathbf{0 . 0 8}+\ldots$

$$
\begin{aligned}
& a_{1}=10 \\
& \hline r=0.2
\end{aligned}
$$

This is an infinite geometric series. $\Longrightarrow$ If $|r|<1$, then $S=\frac{a_{1}}{1-r}$.

$$
\mathbf{S}=
$$

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
5. Evaluate the series $5-10+20-40+\ldots+1280$.

$$
\begin{array}{ll}
\begin{array}{l}
a_{1}=5 \\
r=-2
\end{array} & \text { The series is geometric. } \longrightarrow \\
a_{n}=1280
\end{array} \quad S_{n}=\frac{a_{1}-r a_{n}}{1-r}
$$

6. Evaluate the infinite series $\mathbf{1 0}+\mathbf{2}+\mathbf{0 . 4}+\mathbf{0 . 0 8}+\ldots$

$$
\begin{aligned}
& a_{1}=10 \\
& r=0.2
\end{aligned}
$$

This is an infinite geometric series.

If $|r|<1$, then $S=\frac{a_{1}}{1-r}$.

$$
S=\frac{10}{}
$$

## Algebra 2 Class Worksheet \#6 Unit 9

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This is an infinite geometric series.

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$$
S=\frac{10}{1-0.2}
$$

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$$
\begin{array}{ll}
\begin{array}{ll}
a_{1}=5 \\
r=-2
\end{array} & \text { The series is geometric. } \longrightarrow \\
a_{n}=1280 & S_{n}=\frac{a_{1}-r a_{n}}{1-r} \\
1--2 & =\frac{5565}{3} \Rightarrow S_{n}=855
\end{array}
$$

6. Evaluate the infinite series $\mathbf{1 0}+\mathbf{2}+\mathbf{0 . 4}+\mathbf{0 . 0 8}+\ldots$

$$
\begin{array}{cc}
a_{1}=10 \\
r=0.2
\end{array} \begin{aligned}
& \text { This is an infinite } \\
& \text { geometric series. }
\end{aligned} \longrightarrow \text { If }|r|<1 \text {, then } S=\frac{a_{1}}{1-r} .
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\begin{aligned}
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a_{1}=10 \\
r=0.2
\end{array} \quad \begin{array}{l}
\text { This is an infinite } \\
\text { geometric series. }
\end{array} \longrightarrow \text { If }|r|<1, \text { then } S=\frac{a_{1}}{1-r} . \\
& \qquad S=\frac{10}{1-0.2}=\underline{10}
\end{aligned}
$$

## Algebra 2 Class Worksheet \#6 Unit 9

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\begin{array}{l}
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& \begin{array}{l}
a_{1}=10 \\
r=0.2
\end{array} \quad \begin{array}{l}
\text { This is an infinite } \\
\text { geometric series. }
\end{array} \longrightarrow \text { If }|r|<1, \text { then } S=\frac{a_{1}}{1-r} . \\
& \qquad S=\frac{10}{1-0.2}=\frac{10}{0.8}
\end{aligned}
$$

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$$
\begin{array}{ll}
\begin{array}{ll}
a_{1}=5 \\
r=-2
\end{array} & \text { The series is geometric. } \longrightarrow \\
a_{n}=1280 & S_{n}=\frac{a_{1}-r a_{n}}{1-r} \\
1--2 & =\frac{5--2(1280)}{3} \Rightarrow S_{n}=855
\end{array}
$$

6. Evaluate the infinite series $\mathbf{1 0}+\mathbf{2}+\mathbf{0 . 4}+\mathbf{0 . 0 8}+\ldots$

$$
\begin{aligned}
& \begin{array}{l}
a_{1}=10 \\
r=0.2
\end{array} \begin{array}{l}
\text { This is an infinite } \\
\text { geometric series. }
\end{array} \quad \text { If }|r|<1, \text { then } S=\frac{a_{1}}{1-r} . \\
& \qquad S=\frac{10}{1-0.2}=\frac{10}{0.8} \Rightarrow S=
\end{aligned}
$$

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\end{array} & \text { The series is geometric. } \longrightarrow \\
a_{n}=1280 & S_{n}=\frac{a_{1}-r a_{n}}{1-r} \\
1--2 & =\frac{5--2(1280)}{3} \Rightarrow S_{n}=855
\end{array}
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\begin{aligned}
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a_{1}=10 \\
r=0.2
\end{array} \quad \begin{array}{l}
\text { This is an infinite } \\
\text { geometric series. }
\end{array} \longrightarrow \text { If }|r|<1, \text { then } S=\frac{a_{1}}{1-r} . \\
& \qquad S=\frac{10}{1-0.2}=\frac{10}{0.8} \Rightarrow S=12.5
\end{aligned}
$$

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
5. Evaluate the series $5-10+20-40+\ldots+1280$.

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\begin{array}{ll}
\begin{array}{ll}
a_{1}=5 \\
r=-2
\end{array} & \text { The series is geometric. } \longrightarrow \\
a_{n}=1280 & S_{n}=\frac{a_{1}-r a_{n}}{1-r} \\
1--2 & =\frac{5--2(1280)}{3} \Rightarrow S_{n}=855
\end{array}
$$

6. Evaluate the infinite series $\mathbf{1 0}+\mathbf{2}+\mathbf{0 . 4}+\mathbf{0 . 0 8}+\ldots$

$$
\begin{aligned}
& \mathbf{a}_{1}=10 \\
& r=0.2
\end{aligned} \begin{aligned}
& \text { This is an infinite } \\
& \text { geometric series. }
\end{aligned} \quad \text { If }|r|<1, \text { then } S=\frac{a_{1}}{1-r} .
$$

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
5. Evaluate the series $5-10+20-40+\ldots+1280$.

$$
\begin{array}{ll}
\begin{array}{ll}
a_{1}=5 \\
r & =-2
\end{array} & \text { The series is geometric. } \longrightarrow \\
a_{n}=1280 & S_{n}=\frac{a_{1}-r a_{n}}{1-r} \\
1-2(1280) \\
& =\frac{2565}{3} \Rightarrow S_{n}=855
\end{array}
$$

6. Evaluate the infinite series $\mathbf{1 0}+\mathbf{2}+\mathbf{0 . 4}+\mathbf{0 . 0 8}+\ldots$

$$
\begin{aligned}
& \begin{array}{l}
a_{1}=10 \\
r=0.2
\end{array} \quad \begin{array}{l}
\text { This is an infinite } \\
\text { geometric series. }
\end{array} \quad \text { If }|r|<1, \text { then } S=\frac{a_{1}}{1-r} . \\
& \qquad S=\frac{10}{1-0.2}=\frac{10}{0.8} \Rightarrow S=12.5
\end{aligned}
$$

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
7. Evaluate: $\sum_{i=1}^{10}(-3)(-2)^{i-1}$
8. Evaluate: $\sum_{i=1}^{\infty}\left(\frac{1}{2}\right)\left(\frac{\mathbf{2}}{\mathbf{3}}\right)^{i-1}$

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
7. Evaluate: $\sum_{i=1}^{10}(-3)(-2)^{i-1}$
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## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
7. Evaluate: $\sum_{i=1}^{10}(-3)(-2)^{i-1}$

For any geometric sequence,

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
7. Evaluate: $\sum_{i=1}^{10}(-3)(-2)^{i-1}$

For any geometric sequence, $\mathbf{a}_{\mathrm{n}}=$

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
7. Evaluate: $\sum_{i=1}^{10}(-3)(-2)^{i-1}$

For any geometric sequence, $a_{n}=a_{1}(r)^{n-1}$.

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
7. Evaluate: $\sum_{i=1}^{10} \underset{(-3)(-2)^{i-1}}{ }$

For any geometric sequence, $a_{n}=\stackrel{\downarrow}{a_{1}}(r)^{n-1}$.

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
7. Evaluate:
$\substack{a_{1}=-3}$
$i=1$
$(-3)(-2)^{i-1}$

For any geometric sequence, $a_{n}=\stackrel{\downarrow}{a_{1}}(r)^{n-1}$.

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
7. Evaluate:
$\substack{a_{1}=-3}$
$i=1$
$i 0$
$i=3)(-2)^{i-1}$

For any geometric sequence, $a_{n}=a_{1}(r)^{n-1}$.

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
7. Evaluate:
$\substack{a_{1}=-3}$
$i=1$
$i 0$
$(-3)(-2)^{i-1}$
$r=-2$
For any geometric sequence, $a_{n}=a_{1}(r)^{n-1}$.

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
7. Evaluate:
$a_{1}=-3$$\sum_{i=1}^{10}(-3)(-2)^{i-1}$

$$
r=-2
$$

For any geometric sequence, $a_{n}=a_{1}(r)^{n-1}$.

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
7. Evaluate: $\sum_{i=1}^{10}(-3)(-2)^{i-1}$

$$
r=-2
$$

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
7. Evaluate:
$\sum_{i=1}^{10}(-3)(-2)^{i-1}$
The series is geometric.
$r=-2$

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
7. Evaluate:
$\sum_{i=1}^{10}(-3)(-2)^{i-1}$
The series is geometric.
$r=-2$
$\mathrm{n}=10$

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
7. Evaluate:
$a_{1}=-3$$\sum_{i=1}^{10}(-3)(-2)^{i-1}$

$$
\begin{aligned}
& r=-2 \\
& n=10
\end{aligned}
$$

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
7. Evaluate: $\sum_{\substack{a_{1}=-3}}^{10}(-3)(-2)^{i-1}$
$r=-2$

$$
\mathrm{n}=10
$$

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
7. Evaluate: $\sum_{\substack{a_{1}=-3}}^{10}(-3)(-2)^{i-1}$
$r=-2$
$\mathrm{n}=10$
$S_{10}=$

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
7. Evaluate: $\sum_{i=1}^{10}(-3)(-2)^{i-1}$ $a_{1}=-3 \quad{ }^{1=1}$ The series is geometric. $\Longleftrightarrow S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r}$

$$
\begin{aligned}
& r=-2 \\
& n=10
\end{aligned}
$$

$$
S_{10}=\underline{-3[ }
$$

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
7. Evaluate:
$a_{1}=-3$$\sum_{i=1}^{10}(-3)(-2)^{i-1}$

$$
r=-2
$$

$$
S_{10}=\underline{-3\left[1-(-2)^{10}\right]}
$$

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
7. Evaluate: $\sum_{i=1}^{10}(-3)(-2)^{i-1}$

$$
r=-2
$$

$$
n=10
$$

$$
S_{10}=\frac{-3\left[1-(-2)^{10}\right]}{1--2}
$$

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
7. Evaluate: $\sum_{i=1}^{10}(-3)(-2)^{i-1}$

$$
\begin{aligned}
& r=-2 \\
& n=10
\end{aligned}
$$

$$
S_{10}=\frac{-3\left[1-(-2)^{10}\right]}{1--2}=
$$

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Solve each of the following problems.
7. Evaluate: $\sum_{i=1}^{10}(-3)(-2)^{i-1}$

$$
\begin{aligned}
& r=-2 \\
& n=10
\end{aligned}
$$

$$
S_{10}=\frac{-3\left[1-(-2)^{10}\right]}{1--2}=\underline{3069}
$$

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7. Evaluate: $\sum_{i=1}^{10}(-3)(-2)^{i-1}$

$$
\begin{aligned}
& r=-2 \\
& n=10
\end{aligned}
$$

$$
S_{10}=\frac{-3\left[1-(-2)^{10}\right]}{1--2}=\frac{3069}{3}
$$

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
7. Evaluate: $\sum_{i=1}^{10}(-3)(-2)^{i-1}$ $a_{1}=-3 \quad i=1$

The series is geometric. $\Rightarrow S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r}$

$$
\begin{aligned}
r & =-2 \\
n & =10
\end{aligned}
$$

$$
S_{10}=\frac{-3\left[1-(-2)^{10}\right]}{1--2}=\frac{3069}{3} \Rightarrow S_{10}=
$$

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$$
\begin{aligned}
r & =-2 \\
n & =10
\end{aligned}
$$

$$
S_{10}=\frac{-3\left[1-(-2)^{10}\right]}{1--2}=\frac{3069}{3} \Rightarrow S_{10}=1023
$$

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## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
7. Evaluate:
$a_{1}=-3$$\sum_{i=1}^{10}\left(\begin{array}{l}(-3)(-2)^{i-1} \\ \text { The series }\end{array}\right.$

$$
\begin{aligned}
& r=-2 \\
& n=10
\end{aligned} \quad S_{10}=\frac{-3\left[1-(-2)^{10}\right]}{1--2}=\frac{3069}{3} \Rightarrow S_{10}=1023
$$

8. Evaluate: $\sum_{i=1}^{\infty}\left(\frac{1}{2}\right)\left(\frac{2}{3}\right)^{i-1}$

For any geometric sequence, $a_{n}=a_{1}(r)^{n-1}$.

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
7. Evaluate: $\begin{aligned} & \sum_{i=1}^{10}(-3)(-2)^{i-1} \\ & a_{1}=-3\end{aligned}$
$r=-2$
$n=10$
The series is geometric. $\Rightarrow S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r}$

$$
S_{10}=\frac{-3\left[1-(-2)^{10}\right]}{1--2}=\frac{3069}{3} \Rightarrow S_{10}=1023
$$

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\begin{aligned}
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& n=10
\end{aligned} \quad S_{10}=\frac{-3\left[1-(-2)^{10}\right]}{1--2}=\frac{3069}{3} \Rightarrow S_{10}=1023
$$

8. Evaluate:
$a_{i=1}=1 / 2$

For any geometric sequence, $a_{n}=\stackrel{\downarrow}{\mathbf{a}_{1}(r)^{n-1}}$.

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
7. Evaluate:
$a_{1}=-3$$\sum_{i=1}^{10}\left(\begin{array}{l}(-3)(-2)^{i-1} \\ \text { The series }\end{array}\right.$

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& n=10
\end{aligned} \quad S_{10}=\frac{-3\left[1-(-2)^{10}\right]}{1--2}=\frac{3069}{3} \Rightarrow S_{10}=1023
$$

8. Evaluate: $\sum_{i=1}^{\infty}\left(\frac{1}{2}\right)\left(\frac{2}{3}\right)^{i-1}$
$a_{1}=1 / 2$
$a_{1}=1 / 2$

For any geometric sequence, $a_{n}=a_{1}(\mathbf{r})^{n-1}$.

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
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$a_{1}=-3$$\sum_{i=1}^{10}\left(\begin{array}{l}(-3)(-2)^{i-1} \\ \text { The series }\end{array}\right.$

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\begin{aligned}
& r=-2 \\
& n=10
\end{aligned} \quad S_{10}=\frac{-3\left[1-(-2)^{10}\right]}{1--2}=\frac{3069}{3} \Rightarrow S_{10}=1023
$$

8. Evaluate:
$a_{i=1}^{\infty}=1 / 2$
$r=2 / 3$


## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
7. Evaluate:
$a_{1}=-3$$\sum_{i=1}^{10}(-3)(-2)^{i-1}$

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\begin{aligned}
& \mathrm{r}=-2 \\
& \mathrm{n}=10
\end{aligned} \quad \mathrm{~S}_{10}=\frac{-3\left[1-(-2)^{10}\right]}{1--2}=\frac{3069}{3} \Rightarrow \mathrm{~S}_{10}=1023
$$

8. Evaluate: $\sum_{i=1}^{\infty}\left(\frac{1}{2}\right)\left(\frac{2}{3}\right)^{i-1}$

$$
\begin{aligned}
& a_{1}=1 / 2 \\
& \mathrm{r}=2 / 3
\end{aligned}
$$

For any geometric sequence, $a_{n}=a_{1}(r)^{n-1}$.

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
7. Evaluate:
$a_{1}=-3$$\sum_{i=1}^{10}(-3)(-2)^{i-1}$
$r=-2$
$\mathrm{n}=10$
$S_{10}=\frac{-3\left[1-(-2)^{10}\right]}{1--2}=\frac{3069}{3} \Rightarrow S_{10}=1023$
8. Evaluate: $\sum_{i=1}^{\infty}\left(\frac{1}{2}\right)\left(\frac{2}{3}\right)^{i-1}$

$$
\begin{aligned}
& a_{1}=1 / 2 \\
& r=2 / 3
\end{aligned}
$$

This is an infinite geometric series.

For any geometric sequence, $a_{n}=a_{1}(r)^{n-1}$.

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
7. Evaluate: $\sum_{i=1}^{10}(-3)(-2)^{i-1}$

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\begin{aligned}
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& n=10
\end{aligned} \quad S_{10}=\frac{-3\left[1-(-2)^{10}\right]}{1--2}=\frac{3069}{3} \Rightarrow S_{10}=1023
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\end{aligned} \quad S_{10}=\frac{-3\left[1-(-2)^{10}\right]}{1--2}=\frac{3069}{3} \Rightarrow S_{10}=1023
$$

8. Evaluate: $\sum_{i=1}^{\infty}\left(\frac{1}{2}\right)\left(\frac{2}{3}\right)^{i-1}$

$$
\begin{aligned}
& a_{1}=1 / 2 \\
& r=2 / 3
\end{aligned}
$$

This is an infinite

$$
\Longrightarrow \text { If }|\mathbf{r}|<1,
$$

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
7. Evaluate: $\sum_{i=1}^{10}(-3)(-2)^{i-1}$

$$
\begin{aligned}
& r=-2 \\
& n=10
\end{aligned}
$$

$$
S_{10}=\frac{-3\left[1-(-2)^{10}\right]}{1--2}=\frac{3069}{3} \Rightarrow S_{10}=1023
$$

8. Evaluate: $\sum_{i=1}^{\infty}\left(\frac{1}{2}\right)\left(\frac{2}{3}\right)^{i-1}$

$$
a_{1}=1 / 2
$$

$r=2 / 3$
This is an infinite geometric series. If $|r|<1$, then $S=\frac{a_{1}}{1-r}$.

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
7. Evaluate:
$a_{1}=-3$$\sum_{i=1}^{10}\left(\begin{array}{l}(-3)(-2)^{i-1} \\ \text { The series }\end{array}\right.$
$r=-2$
$\mathrm{n}=10$
$S_{10}=\frac{-3\left[1-(-2)^{10}\right]}{1--2}=\frac{3069}{3} \Rightarrow S_{10}=1023$
8. Evaluate: $\sum_{i=1}^{\infty}\left(\frac{1}{2}\right)\left(\frac{2}{3}\right)^{i-1}$

$$
\begin{aligned}
& a_{1}=1 / 2 \\
& r=2 / 3
\end{aligned}
$$

This is an infinite

$$
\Longrightarrow \text { If }|r|<1, \text { then } S=\frac{a_{1}}{1-r} .
$$

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
7. Evaluate:
$a_{1}=-3$$\sum_{i=1}^{10}\left(\begin{array}{l}(-3)(-2)^{i-1} \\ \text { The series }\end{array}\right.$

$$
\begin{aligned}
& r=-2 \\
& n=10
\end{aligned} \quad S_{10}=\frac{-3\left[1-(-2)^{10}\right]}{1--2}=\frac{3069}{3} \Rightarrow S_{10}=1023
$$

8. Evaluate: $\sum_{i=1}^{\infty}\left(\frac{1}{2}\right)\left(\frac{2}{3}\right)^{i-1}$

$$
\begin{aligned}
& a_{1}=1 / 2 \\
& r=2 / 3
\end{aligned}
$$

This is an infinite geometric series.

$$
\text { If }|r|<1, \text { then } S=\frac{a_{1}}{1-r}
$$

$$
\mathbf{S}=
$$

## Algebra 2 Class Worksheet \#6 Unit 9

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$$
\text { The series is geometric. } \Rightarrow S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r}
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$$
r=2 / 3
$$

This is an infinite geometric series.

$$
S=\frac{1 / 2}{1-2 / 3}=\frac{1 / 2}{1 / 3} \Rightarrow S=1.5
$$

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
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$$
a_{1}=1 / 2
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$$
r=2 / 3
$$

This is an infinite $\Longrightarrow$ If $|r|<1$, then $S=\frac{a_{1}}{1-r}$.

$$
S=\frac{1 / 2}{1-2 / 3}=\frac{1 / 2}{1 / 3} \Rightarrow S=1.5
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## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
9. A job has a starting salary of $\$ 38,000$ with a guaranteed increase of 3\% per year. Find the total salary for the first ten years.

## Algebra 2 Class Worksheet \#6 Unit 9

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Solve each of the following problems.
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Solve each of the following problems.
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Let $a_{n}$ represent the salary, in dollars, for the $n^{\text {th }}$ year.
$a_{1}=38,000$

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$a_{1}=38,000 \quad$ The series is geometric.

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$$
r=1.03
$$

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\begin{array}{c}
n=10
\end{array} & S_{10}=\frac{38,000\left(1-1.03{ }^{10}\right)}{1-1.03} \approx \frac{\mathbf{- 1 3 , 0 6 9}}{-0.03} \\
S_{10} \approx 435,627
\end{array}
$$

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The total salary is about $\$ 435,627$.

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## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
10. A ball is dropped from a height of 108 inches onto a concrete floor. On each bounce the ball rebounds to $\mathbf{7 5 \%}$ of its previous height. What is the total vertical distance that the ball has traveled when it hits the floor for the eighth time?

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
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10. A ball is dropped from a height of 108 inches onto a concrete floor. On each bounce the ball rebounds to $\mathbf{7 5 \%}$ of its previous height. What is the total vertical distance that the ball has traveled when it hits the floor for the eighth time?
We will use two geometric series for this problem. One for the downward motion of the ball, and the other for the upward motion of the ball.

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Solve each of the following problems.
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Downward Motion

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Downward Motion

$$
a_{1}=108 \text { (inches) }
$$

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Downward Motion Upward Motion

$$
a_{1}=108 \text { (inches) }
$$

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
10. A ball is dropped from a height of 108 inches onto a concrete floor. On each bounce the ball rebounds to $75 \%$ of its previous height. What is the total vertical distance that the ball has traveled when it hits the floor for the eighth time?
We will use two geometric series for this problem. One for the downward motion of the ball, and the other for the upward motion of the ball.

Downward Motion Upward Motion

$$
a_{1}=108 \text { (inches) }
$$

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Solve each of the following problems.
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We will use two geometric series for this problem. One for the downward motion of the ball, and the other for the upward motion of the ball.

Downward Motion

$$
a_{1}=108 \text { (inches) }
$$

Upward Motion
$a_{1}=81$ (inches)

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
10. A ball is dropped from a height of 108 inches onto a concrete floor. On each bounce the ball rebounds to $75 \%$ of its previous height. What is the total vertical distance that the ball has traveled when it hits the floor for the eighth time?
We will use two geometric series for this problem. One for the downward motion of the ball, and the other for the upward motion of the ball.

Downward Motion

$$
a_{1}=108 \text { (inches) }
$$

Upward Motion

$$
a_{1}=81 \text { (inches) }(75 \% \text { of } 108)
$$

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
10. A ball is dropped from a height of 108 inches onto a concrete floor. On each bounce the ball rebounds to $75 \%$ of its previous height. What is the total vertical distance that the ball has traveled when it hits the floor for the eighth time?
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Downward Motion

$$
a_{1}=108 \text { (inches) }
$$

Upward Motion
$a_{1}=81$ (inches) (75\% of 108)

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Solve each of the following problems.
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We will use two geometric series for this problem. One for the downward motion of the ball, and the other for the upward motion of the ball.

Downward Motion

$$
a_{1}=108 \text { (inches) }
$$

$$
\mathbf{r}=75 \%
$$

> Upward Motion
> $a_{1}=81$ (inches) $(75 \%$ of 108$)$

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Downward Motion

$$
a_{1}=108 \text { (inches) }
$$

Upward Motion
$\mathrm{r}=\mathbf{7 5 \%}=\mathbf{0 . 7 5}$

$$
a_{1}=81 \text { (inches) }(75 \% \text { of } 108)
$$

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Downward Motion

$$
a_{1}=108 \text { (inches) }
$$

$$
r=75 \%=0.75
$$

Upward Motion

$$
a_{1}=81 \text { (inches) }(75 \% \text { of } 108)
$$

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Downward Motion

$$
\begin{aligned}
& a_{1}=108 \text { (inches) } \\
& r=75 \%=0.75
\end{aligned}
$$

Upward Motion

$$
\begin{gathered}
a_{1}=81 \text { (inches) }(75 \% \text { of } 108) \\
r=0.75
\end{gathered}
$$

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Downward Motion

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\begin{aligned}
& a_{1}=108 \text { (inches) } \\
& r=75 \%=0.75
\end{aligned}
$$

Upward Motion
$a_{1}=81$ (inches) (75\% of 108)
$r=0.75$

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Downward Motion

$$
\begin{aligned}
& a_{1}=108 \text { (inches) } \\
& r=75 \%=0.75 \\
& n=8
\end{aligned}
$$

Upward Motion

$$
a_{1}=81 \text { (inches) }(75 \% \text { of } 108)
$$

$$
r=0.75
$$

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\begin{aligned}
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& r=75 \%=0.75 \\
& n=8
\end{aligned}
$$

Upward Motion

$$
\begin{gathered}
a_{1}=81 \text { (inches) }(75 \% \text { of } 108) \\
\quad r=0.75 \\
n=7
\end{gathered}
$$

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\begin{aligned}
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& \quad n=8
\end{aligned}
$$

Upward Motion

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\begin{gathered}
a_{1}=81 \text { (inches) }(75 \% \text { of } 108) \\
\quad r=0.75 \\
n=7
\end{gathered}
$$

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r}
$$

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Downward Motion

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\begin{aligned}
& a_{1}=108 \text { (inches) } \\
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& n=8
\end{aligned}
$$

Upward Motion

$$
\begin{gathered}
a_{1}=81 \text { (inches) }(75 \% \text { of } 108) \\
\quad r=0.75 \\
n=7
\end{gathered}
$$

$\mathrm{S}_{8}=$

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S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r}
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$$
\begin{array}{c|c}
\hline \text { Downward Motion } & \text { Upward Motion } \\
a_{1}=108 \text { (inches) } & a_{1}=81 \text { (inches) (75\% of 108) } \\
\mathbf{r}=75 \%=0.75 & \mathbf{r}=0.75 \\
n=8 & n=7
\end{array}
$$

$$
S_{8}=108(
$$

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S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r}
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$$
\begin{array}{cc}
\text { Downward Motion } & \text { Upward Motion } \\
a_{1}=108 \text { (inches) } & a_{1}=81 \text { (inches) } \\
\mathbf{( 7 5 \%} \text { of 108) } \\
\mathbf{r}=\mathbf{7 5 \%}=\mathbf{0 . 7 5} & \mathbf{r}=0.75 \\
\mathrm{n}=8 & \mathrm{n}=7
\end{array}
$$

$$
S_{8}=\underline{108\left(1-0.75^{8}\right)}
$$

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r}
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r=75 \%=0.75
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\mathrm{n}=\mathbf{8}
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$$
S_{8}=\frac{108\left(1-0.75^{8}\right)}{(1-0.75)}
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Upward Motion

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\begin{gathered}
a_{1}=81 \text { (inches) }(75 \% \text { of } 108) \\
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r=75 \%=0.75
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\mathrm{n}=\mathbf{8}
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Upward Motion

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\begin{gathered}
a_{1}=81 \text { (inches) }(75 \% \text { of } 108) \\
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r=75 \%=0.75
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$$
\mathrm{n}=\mathbf{8}
$$

$$
S_{8}=\frac{108\left(1-0.75^{8}\right)}{(1-0.75)}
$$

$$
\mathbf{S}_{7}=
$$

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r}
$$

$$
\begin{gathered}
a_{1}=81 \text { (inches) }(75 \% \text { of } 108) \\
\quad r=0.75 \\
n=7
\end{gathered}
$$

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Downward Motion $a_{1}=108$ (inches)

$$
r=75 \%=0.75
$$

$$
\mathbf{n}=\mathbf{8}
$$

$$
S_{8}=\frac{108\left(1-0.75^{8}\right)}{(1-0.75)}
$$

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r}
$$

$$
\begin{aligned}
& \mathrm{a}_{1}=81 \text { (inches) }(\mathbf{7 5 \%} \text { of } 108) \\
& \quad \mathrm{r}=0.75 \\
& \mathrm{n}=7
\end{aligned}
$$

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Downward Motion $a_{1}=108$ (inches)

$$
r=75 \%=0.75
$$

$$
\mathrm{n}=\mathbf{8}
$$

$$
S_{8}=\frac{108\left(1-0.75^{8}\right)}{(1-0.75)}
$$

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r}
$$

$$
a_{1}=81 \text { (inches) }(75 \% \text { of } 108)
$$

$$
\mathbf{r}=0.75
$$

$$
\mathrm{n}=7
$$

$$
S_{7}=\frac{81\left(1-0.75^{7}\right)}{}
$$

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Downward Motion $a_{1}=108$ (inches)

Upward Motion

$$
r=75 \%=0.75
$$

$$
\mathrm{n}=\mathbf{8}
$$

$$
S_{8}=\frac{108\left(1-0.75^{8}\right)}{(1-0.75)}
$$

$$
\begin{aligned}
& a_{1}=81 \text { (inches) }(75 \% \text { of } 108) \\
& \quad r=0.75 \\
& n=7 \\
& S_{7}=\frac{81\left(1-0.75^{7}\right)}{(1-0.75)}
\end{aligned}
$$

$$
S_{n}=\frac{a_{1}\left(1-r^{n}\right)}{1-r}
$$

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Solve each of the following problems.
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$$
\begin{array}{cc}
\text { Downward Motion } & \text { Upward Motion } \\
a_{1}=108 \text { (inches) } & a_{1}=81 \text { (inches) (75\% of 108) } \\
r=75 \%=0.75 & r=0.75 \\
n=8 & n=7 \\
S_{8}=\frac{108\left(1-0.75^{8}\right)}{(1-0.75)} & S_{7}=\frac{81\left(1-0.75^{7}\right)}{(1-0.75)}
\end{array}
$$

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\begin{gathered}
\text { Downward Motion } \\
a_{1}=108 \text { (inches) } \\
r=75 \%=0.75 \\
n=8 \\
S_{8}=\frac{108\left(1-0.75^{8}\right)}{(1-0.75)}
\end{gathered}
$$

Upward Motion

$$
a_{1}=81 \text { (inches) }(75 \% \text { of } 108)
$$

$$
\begin{gathered}
\mathrm{r}=0.75 \\
\mathrm{n}=7 \\
\mathrm{~S}_{7}=\frac{81\left(1-0.75^{7}\right)}{(1-0.75)}
\end{gathered}
$$

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\begin{array}{c|c}
\text { Downward Motion } & \text { Upward Motion } \\
a_{1}=108 \text { (inches) } & a_{1}=81 \text { (inches) }(\mathbf{7 5 \%} \text { of 108) } \\
r=75 \%=0.75 & r=0.75 \\
n=8 & n=7 \\
S_{8}=\frac{108\left(1-0.75^{8}\right)}{(1-0.75)} \approx & S_{7}=\frac{81\left(1-0.75^{7}\right)}{(1-0.75)}
\end{array}
$$

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Solve each of the following problems.
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\begin{array}{c|c}
\text { Downward Motion } & \text { Upward Motion } \\
a_{1}=108 \text { (inches) } & a_{1}=81 \text { (inches) }(75 \% \text { of 108) } \\
r=75 \%=0.75 & r=0.75 \\
n=8 & n=7 \\
S_{8}=\frac{108\left(1-0.75^{8}\right)}{(1-0.75)} \approx \underline{97.19} & S_{7}=\frac{81\left(1-0.75^{7}\right)}{(1-0.75)}
\end{array}
$$

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Solve each of the following problems.
10. A ball is dropped from a height of 108 inches onto a concrete floor. On each bounce the ball rebounds to $\mathbf{7 5 \%}$ of its previous height. What is the total vertical distance that the ball has traveled when it hits the floor for the eighth time?
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\begin{array}{c|c}
\text { Downward Motion } & \text { Upward Motion } \\
a_{1}=108 \text { (inches) } & a_{1}=81 \text { (inches) }(75 \% \text { of 108) } \\
r=75 \%=0.75 & r=0.75 \\
n=8 & n=7 \\
S_{8}=\frac{108\left(1-0.75^{8}\right)}{(1-0.75)} \approx \frac{97.19}{0.25} & S_{7}=\frac{81\left(1-0.75^{7}\right)}{(1-0.75)}
\end{array}
$$

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$$
\begin{aligned}
& \text { Downward Motion Upward Motion } \\
& \mathrm{a}_{1}=108 \text { (inches) } \\
& r=75 \%=0.75 \\
& \mathrm{n}=8 \\
& S_{8}=\frac{108\left(1-0.75^{8}\right)}{(1-0.75)} \approx \frac{97.19}{0.25} \\
& \mathrm{~S}_{8} \approx 388.75 \text { (inches) } \\
& a_{1}=81 \text { (inches) }(\mathbf{7 5 \%} \text { of 108) } \\
& \mathrm{r}=0.75 \\
& \mathrm{n}=7 \\
& S_{7}=\frac{81\left(1-0.75^{7}\right)}{(1-0.75)}
\end{aligned}
$$

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Downward Motion $a_{1}=108$ (inches)
$r=75 \%=0.75$
$\mathrm{n}=8$
$S_{8}=\frac{108\left(1-0.75^{8}\right)}{(1-0.75)} \approx \frac{97.19}{0.25}$
$\mathrm{S}_{8} \approx 388.75$ (inches)

Upward Motion

$$
a_{1}=81 \text { (inches) }(75 \% \text { of } 108)
$$

$$
r=0.75
$$

$$
\mathrm{n}=7
$$

$$
S_{7}=\frac{81\left(1-0.75^{7}\right)}{(1-0.75)}
$$

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Downward Motion Upward Motion $a_{1}=108$ (inches)
$\mathrm{r}=75 \%=0.75$
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$S_{8}=\frac{108\left(1-0.75^{8}\right)}{(1-0.75)} \approx \frac{97.19}{0.25}$
$\mathrm{S}_{8} \approx 388.75$ (inches)

$$
a_{1}=81 \text { (inches) }(75 \% \text { of } 108)
$$

$$
r=0.75
$$

$$
\mathrm{n}=7
$$

$$
S_{7}=\frac{81\left(1-0.75^{7}\right)}{(1-0.75)} \approx
$$

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
10. A ball is dropped from a height of 108 inches onto a concrete floor. On each bounce the ball rebounds to $\mathbf{7 5 \%}$ of its previous height. What is the total vertical distance that the ball has traveled when it hits the floor for the eighth time?
We will use two geometric series for this problem. One for the downward motion of the ball, and the other for the upward motion of the ball.

Downward Motion $a_{1}=108$ (inches)
$r=75 \%=0.75$
$\mathrm{n}=8$
$S_{8}=\frac{108\left(1-0.75^{8}\right)}{(1-0.75)} \approx \frac{97.19}{0.25}$
$\mathrm{S}_{8} \approx 388.75$ (inches)

Upward Motion

$$
a_{1}=81 \text { (inches) }(75 \% \text { of } 108)
$$

$$
r=0.75
$$

$$
\mathrm{n}=7
$$

$$
S_{7}=\frac{81\left(1-0.75^{7}\right)}{(1-0.75)} \approx \underline{70.19}
$$

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$\mathrm{S}_{8} \approx 388.75$ (inches)

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$r=75 \%=0.75$
$\mathrm{n}=8$
$S_{8}=\frac{108\left(1-0.75^{8}\right)}{(1-0.75)} \approx \frac{97.19}{0.25}$
$\mathrm{S}_{8} \approx 388.75$ (inches)

Upward Motion
$a_{1}=81$ (inches) (75\% of 108)
$r=0.75$
n $=7$
$S_{7}=\frac{81\left(1-0.75^{7}\right)}{(1-0.75)} \approx \frac{70.19}{0.25}$
$\mathrm{S}_{7} \approx 280.75$ (inches)

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$$
\begin{array}{cc}
\text { Downward Motion } & \text { Upward Motion } \\
a_{1}=108 \text { (inches) } & a_{1}=81 \text { (inches) }(75 \% \text { of } 108) \\
\mathbf{r}=75 \%=0.75 & \mathbf{r}=0.75 \\
\mathrm{n}=8 & \mathrm{n}=7 \\
\mathrm{~S}_{8}=\frac{108\left(1-0.75^{8}\right)}{(1-0.75)} \approx \frac{97.19}{0.25} & \mathrm{~S}_{7}=\frac{81\left(1-0.75^{7}\right)}{(1-0.75)} \approx \frac{70.19}{0.25} \\
\mathrm{~S}_{8} \approx \mathbf{3 8 8 . 7 5}(\text { inches }) & \mathrm{S}_{7} \approx 280.75 \text { (inches) }
\end{array}
$$

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$$
\begin{array}{cc}
\begin{array}{c}
\text { Downward Motion } \\
a_{1}=108 \text { (inches) }
\end{array} & \begin{array}{c}
\text { Upward Motion } \\
a_{1}=81 \\
\text { (inches) } \\
\mathbf{r}=75 \%=0.75
\end{array} \\
\mathrm{n}=8 & \mathrm{r}=0.75 \\
\mathrm{~S}_{8}=\frac{108\left(1-0.75^{8}\right)}{(1-0.75)} \approx \frac{97.19}{0.25} & \mathrm{~S}_{7}=\frac{81\left(1-0.75^{7}\right)}{(1-0.75)} \\
\mathrm{S}_{8} \approx \mathbf{3 8 8 . 7 5} \text { (inches) } & \mathrm{S}_{7} \approx \mathbf{2 8 0 . 7 5}(\mathrm{inc}
\end{array}
$$

The total vertical distance is about 669.5 inches.

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$$
\begin{aligned}
& \text { Downward Motion Upward Motion } \\
& \mathrm{a}_{1}=108 \text { (inches) } \\
& r=75 \%=0.75 \\
& \mathrm{n}=8 \\
& S_{8}=\frac{108\left(1-0.75^{8}\right)}{(1-0.75)} \approx \frac{97.19}{0.25} \\
& \mathrm{~S}_{8} \approx 388.75 \text { (inches) }
\end{aligned}
$$

The total vertical distance is about 669.5 inches.

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\begin{array}{cc}
\text { Downward Motion } & \text { Upward Motion } \\
\mathbf{a}_{1}=108 \text { (inches) } & a_{1}=81 \text { (inches) }(\mathbf{7 5 \%} \% \text { of } 108) \\
\mathbf{r}=75 \%=0.75 & \mathbf{r}=0.75 \\
\mathrm{n}=8 & \mathrm{n}=7 \\
\mathrm{~S}_{8}=\frac{108\left(1-0.5^{8}\right)}{(1-0.75)} \approx \frac{\mathbf{9 7 . 1 9}}{0.25} & \mathrm{~S}_{7}=\frac{\mathbf{8 1}\left(1-0.75^{7}\right)}{(1-0.75)} \approx \frac{70.19}{0.25} \\
\mathrm{~S}_{8} \approx \mathbf{3 8 8 . 7 5} \text { (inches) } & \mathrm{S}_{7} \approx 280.75 \text { (inches) }
\end{array}
$$

The total vertical distance is about 669.5 inches.

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Downward Motion

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Downward Motion

$$
\mathbf{a}_{1}=
$$

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Downward Motion

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$$

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$$
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$$
\begin{array}{cc}
\text { Downward Motion } & \text { Upward Motion } \\
a_{1}=108 \text { (inches) } & a_{1}=\mathbf{8 1} \text { (inches) }
\end{array}
$$

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\begin{array}{cc}
\text { Downward Motion } & \text { Upward Motion } \\
a_{1}=108 \text { (inches) } & a_{1}=81 \text { (inches) }(\mathbf{7 5 \%} \text { of } 108)
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$$
\begin{array}{l|l}
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\begin{array}{c}
a_{1}=108 \text { (inches) }
\end{array} & a_{1}=81 \text { (inches) }(75 \% \text { of } 108) \\
r= &
\end{array}
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r=0.75 & r=
\end{array}
$$

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\end{array}
$$

$$
S=\frac{a_{1}}{1-r}
$$

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\begin{array}{cr}
\text { Downward Motion } & \text { Upward Motion } \\
a_{1}=108 \text { (inches) } & a_{1}=81 \text { (inches) }(75 \% \text { of } 108) \\
r=0.75 & r=0.75
\end{array}
$$

$S=$

$$
S=\frac{a_{1}}{1-r}
$$

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\[

\]

$$
S=-108
$$

$$
S=\frac{\mathbf{a}_{1}}{1-\mathbf{r}}
$$

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$$
\begin{array}{l|r} 
& \begin{array}{c}
\text { Downward Motion } \\
a_{1}=108 \text { (inches) }
\end{array} \\
r=0.75 & a_{1}=81 \text { (inches) }(75 \% \text { of 108) } \\
S=\frac{108}{(1-0.75)} & r=0.75 \\
\hline
\end{array}
$$

$$
S=\frac{a_{1}}{1-r}
$$

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\begin{array}{c|c}
\begin{array}{c}
\text { Downward Motion } \\
a_{1}=108 \text { (inches) }
\end{array} & a_{1}=81 \text { (inches) }(75 \% \text { of 108) } \\
r=0.75 & r=0.75 \\
S=\frac{108}{(1-0.75)}= &
\end{array}
$$

$$
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$$

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$$
\begin{array}{c|c}
\text { Downward Motion } & \text { Upward Motion } \\
\mathbf{a}_{1}=108 \text { (inches) } & a_{1}=81 \text { (inches) ( } 75 \% \text { of 108) } \\
\mathbf{r}=0.75 & \mathbf{r}=0.75
\end{array}
$$

$$
S=\frac{108}{(1-0.75)}=432 \text { inches }
$$

$$
S=\frac{a_{1}}{1-r}
$$

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$$
\begin{array}{cc}
\begin{array}{c}
\text { Downward Motion } \\
a_{1}=108 \text { (inches) }
\end{array} & \begin{array}{c}
\text { Upward Motion } \\
r=01 \\
\text { (inches) } \\
(75 \% \\
\text { of 108) }
\end{array} \\
S=\frac{108}{(1-0.75)}=432 \text { inches } & r=0.75
\end{array}
$$

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$$
\left.\begin{array}{cc}
\begin{array}{c}
\text { Downward Motion } \\
a_{1}=108 \text { (inches) } \\
r=0.75
\end{array} & \begin{array}{c}
\text { Upward Motion } \\
1
\end{array} \\
S=\frac{108}{(1-0.75)}=432 \text { inches } & r=0.75 \\
(75 \% \text { of 108) }
\end{array}\right)
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$$
\begin{array}{cr}
\begin{array}{c}
\text { Downward Motion } \\
a_{1}=108 \text { (inches) } \\
r=0.75 \\
S= \\
(1-0.75)
\end{array} a_{1}=8 \\
& \\
\hline \mathbf{1 0 8} \\
\hline
\end{array}
$$

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\begin{array}{c|c}
\begin{array}{c}
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a_{1}=108 \text { (inches) } \\
r=0.75
\end{array} & a_{1}=81 \text { (inches) } \\
\mathbf{( 7 5 \%} \text { of 108) } \\
S=\frac{108}{(1-0.75)}=432 \text { inches } & S=\frac{81}{}
\end{array}
$$

$$
S=\frac{a_{1}}{1-r}
$$

## Algebra 2 Class Worksheet \#6 Unit 9

Solve each of the following problems.
11. A ball is dropped from a height of 108 inches onto a concrete floor. On each bounce the ball rebounds to $\mathbf{7 5 \%}$ of its previous height. What is the total vertical distance that the ball will travel before it comes to rest?
We will use two infinite geometric series for this problem. One for the downward motion and the other for the upward motion of the ball.

$$
\begin{array}{cc}
\begin{array}{c}
\text { Downward Motion } \\
a_{1}=108 \text { (inches) } \\
r=0.75
\end{array} & \begin{array}{c}
\text { Upward Motion } \\
1
\end{array} \\
\mathbf{8 1} \text { (inches) (75\% of 108) } \\
\mathbf{r}=0.75 \\
(1-0.75) & 108 \\
432 \text { inches } & S=\frac{81}{(1-0.75)}
\end{array}
$$

$$
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r=0.75
\end{array} & a_{1}=81 \text { (inches) (75\% of 108) } \\
\mathbf{r}=0.75
\end{array}\right)
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\begin{array}{c}
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\end{array} & \begin{array}{c}
\text { Upward Motion } \\
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\end{array} \\
S=\frac{108}{(1-0.75)}=432 \text { inches } & \mathrm{r}=0.75
\end{array}\right)
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\begin{array}{cc}
\begin{array}{c}
\text { Downward Motion } \\
a_{1}=108 \text { (inches) }
\end{array} & \begin{array}{c}
\text { Upward Motion } \\
r=0.75
\end{array} \\
S=\frac{108}{(1-0.75)}=432 \text { inches } & \mathrm{r}=0.75 \\
S=\frac{81}{(1-0.75)}=324 \text { inches }
\end{array}
$$

The total vertical distance is 756 inches.

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\end{array} & \begin{array}{c}
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r=0.75
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S=\frac{81}{(1-0.75)}=324 \text { inches }
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