

Math Sheet

Name _____ Score _____ Teacher _____ Date _____

Accumulation, Average Value, and Net Change

Use a definite integral to interpret signed change, average value, or recovery from an initial value. Label estimated table results.

1. table t : 0, 2; $r(t)$: 4, 12, for $0 \leq t \leq 2$, with t in seconds and $r(t)$ in meters per seconds. Use a trapezoid estimate. Find signed net change.

2. $r(t)=2t-1$, for $0 \leq t \leq 2$, with t in seconds and $r(t)$ in meters per seconds. Find the average value of the rate.

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3. $r(t)=3t-3$, for $0 \leq t \leq 4$, with t in seconds and $r(t)$ in meters per seconds. Find signed net change.

4. $r(t)=2t+3$, for $0 \leq t \leq 3$, with t in seconds and $r(t)$ in meters per seconds. If $Q(0)=11$ meters, find $Q(3)$.

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5. table t : 0, 2; $r(t)$: 2, 6, for $0 \leq t \leq 2$, with t in seconds and $r(t)$ in meters per seconds. Use a trapezoid estimate. If $Q(0)=17$ meters, find $Q(2)$.

6. table t : 0, 3; $r(t)$: -2, 10, for $0 \leq t \leq 3$, with t in seconds and $r(t)$ in meters per seconds. Use a trapezoid estimate. Find the average value of the rate.

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Worked Answer Key

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1. table t : 0, 2; $r(t)$: 4, 12, for $0 \leq t \leq 2$, with t in seconds and $r(t)$ in meters per seconds. Use a trapezoid estimate. Find signed net change.

Answer: Approximately 16 meters.

1. Use the trapezoid estimate: $\int_0^2 r(t) dt$ approximately $2[4+12]/2=16$.
2. The sign records direction or gain/loss.

2. $r(t)=2t-1$, for $0 \leq t \leq 2$, with t in seconds and $r(t)$ in meters per seconds. Find the average value of the rate.

Answer: 1 meters per seconds.

1. Integral from 0 to 2 of $(2t-1)dt=2$.
2. Divide by interval length 2: $2/2=1$.

Accumulation, Average Value, and Net Change

Worked Answer Key

Use a definite integral to interpret signed change, average value, or recovery from an initial value. Label estimated table results.

3. $r(t)=3t-3$, for $0 \leq t \leq 4$, with t in seconds and $r(t)$ in meters per seconds. Find signed net change.

Answer: 12 meters.

1. Integral from 0 to 4 of $(3t-3)dt=12$.
2. The sign records direction or gain/loss.

4. $r(t)=2t+3$, for $0 \leq t \leq 3$, with t in seconds and $r(t)$ in meters per seconds. If $Q(0)=11$ meters, find $Q(3)$.

Answer: 29 meters.

1. Integral from 0 to 3 of $(2t+3)dt=18$.
2. $Q(3)=11+18=29$.

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Worked Answer Key

Use a definite integral to interpret signed change, average value, or recovery from an initial value. Label estimated table results.

5. table t : 0, 2; $r(t)$: 2, 6, for $0 \leq t \leq 2$, with t in seconds and $r(t)$ in meters per seconds. Use a trapezoid estimate. If $Q(0)=17$ meters, find $Q(2)$.

Answer: Approximately 25 meters.

1. Use the trapezoid estimate: $\int_0^2 r(t) dt$ approximately $2[2+6]/2=8$.
2. $Q(2)=17+8=25$.

6. table t : 0, 3; $r(t)$: -2, 10, for $0 \leq t \leq 3$, with t in seconds and $r(t)$ in meters per seconds. Use a trapezoid estimate. Find the average value of the rate.

Answer: Approximately 4 meters per seconds.

1. Use the trapezoid estimate: $\int_0^3 r(t) dt$ approximately $3[-2+10]/2=12$.
2. Divide by interval length 3: $12/3=4$.