

Acceleration Worksheet

**Equations:**

$$a = \frac{v_2 - v_1}{\Delta t} \quad \text{OR} \quad \Delta t = \frac{v_2 - v_1}{a} \quad \text{OR} \quad v_2 = a \times \Delta t + v_1$$

1. A roller coaster car rapidly picks up speed as it rolls down a slope. As it starts down the slope, its speed is 4 m/s. But 3 seconds later, at the bottom of the slope, its speed is 22 m/s. What is its average acceleration?
2. A cyclist accelerates from 0 m/s to 8 m/s in 3 seconds. What is his acceleration? Is this acceleration higher than that of a car which accelerates from 0 to 30 m/s in 8 seconds?
3. A car advertisement states that a certain car can accelerate from rest to 70 km/h in 7 seconds. Find the car's average acceleration.
4. A lizard accelerates from 2 m/s to 10 m/s in 4 seconds. What is the lizard's average acceleration?
5. If a Ferrari, with an initial velocity of 10 m/s, accelerates at a rate of 50 m/s/s for 3 seconds, what will its final velocity be?

ICP Physics – Unit A Kinematics – Mathematics of Motion - Velocity & Acceleration Worksheet

1. It takes Serina 0.25 hour to drive to school. Her route is 16 km long. What is Serina's average speed on her drive to school?

<b>GIVEN:</b>	<b>WORK:</b>
<b>FORMULA:</b>	
	<b>ANSWER:</b>

2. In a competition, an athlete threw a flying disk 139 meters through the air. While in flight, the disk traveled at an average speed of 13.0 m/s. How long did the disk remain in the air?

<b>GIVEN:</b>	<b>WORK:</b>
<b>FORMULA:</b>	
	<b>ANSWER:</b>

3. A runner covers the last straight stretch of a race in 4 s. During that time, he speeds up from 5 m/s to 9 m/s. What is the runner's acceleration in this part of the race?

<b>GIVEN:</b>	<b>WORK:</b>
<b>FORMULA:</b>	
	<b>ANSWER:</b>

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4. If you shout into the Grand Canyon, your voice travels at the speed of sound (340 m/s) to the bottom of the canyon and back, and you hear an echo. How deep is the Grand Canyon at a spot where you can hear your echo 5.2 seconds after you shout?

<b>GIVEN:</b>	<b>WORK:</b>
<b>FORMULA:</b>	
	<b>ANSWER:</b>

5. Falling objects drop with an average acceleration of  $9.8 \text{ m/s}^2$ . If an object falls from a tall building, how long will it take before it reaches a speed of 49 m/s?

<b>GIVEN:</b>	<b>WORK:</b>
<b>FORMULA:</b>	
	<b>ANSWER:</b>

6. Josh rolled a bowling ball down a lane in 2.5 s. The ball traveled at a constant acceleration of  $1.8 \text{ m/s}^2$  down the lane and was traveling at a speed of 7.6 m/s by the time it reached the pins at the end of the lane. How fast was the ball going when it left Tim's hand?

<b>GIVEN:</b>	<b>WORK:</b>
<b>FORMULA:</b>	
	<b>ANSWER:</b>

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Calculate the acceleration for the following data. SHOW WORK!

	<u>V1</u>	<u>V2</u>	<u>ΔTime</u>	<u>Acceleration</u>
1.	0m/s	24 m/s	3 s	_____
2.	0 m/s	35 m/s	5 s	_____
3.	20 m/s	60 m/s	10 s	_____
4.	50 m/s	150 m/s	5 s	_____
5.	25 m/s	1200 m/s	3600 s	_____

6. A car accelerates from a standstill to 60 m/s in 10 seconds. What is the acceleration?

7. A car accelerates from 25 km/hr to 55 km/hr in 30 seconds. What is its acceleration?

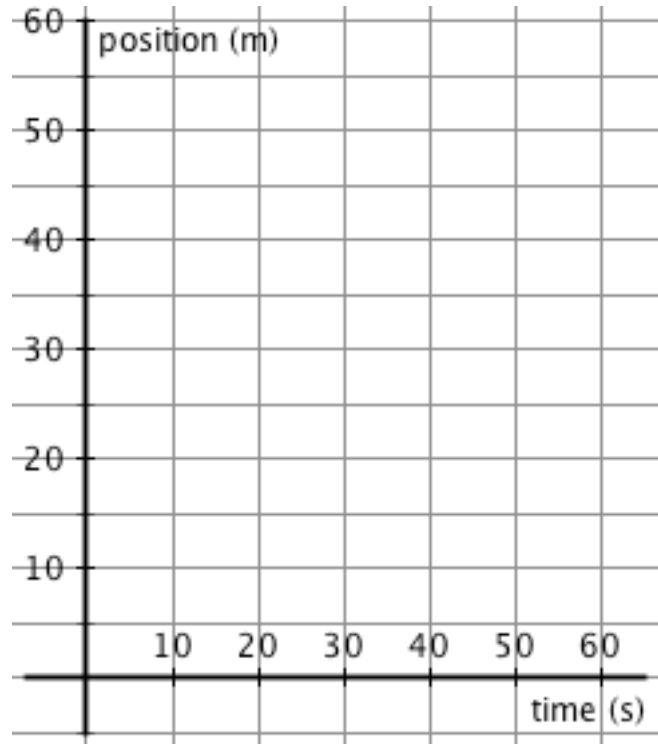
8. A train is accelerating at a rate of 2 m/s. If its initial velocity is 20 m/s, what is its velocity after 30 seconds?

9. A runner achieves a velocity of 11.1 m/s, 9 sec after he begins. What is his acceleration? What distance did he cover?

Graphing Distance vs. Time

Plot the following data on the graph and answer the following questions below. SHOW WORK IF APPLIES!

Time (s)	Distance (m)
0	0
10	5
20	12
30	20
40	30
50	42
60	56



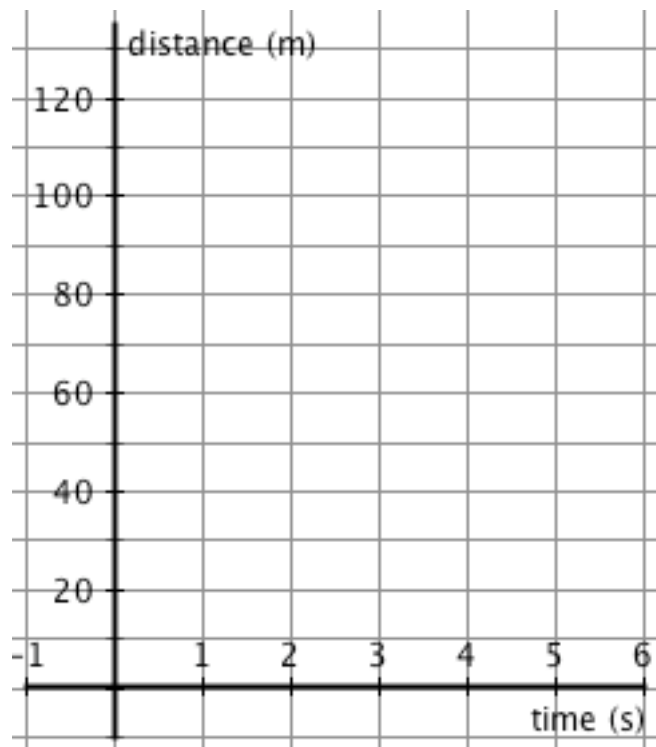
1. What is the average speed at 20 s? \_\_\_\_\_
2. What is the average speed at 30 s? \_\_\_\_\_
3. What is the acceleration between 20 and 30 s? \_\_\_\_\_
4. What is the average speed at 40 s? \_\_\_\_\_
5. What is the average speed at 60 s? \_\_\_\_\_
6. What is the acceleration between 40 and 60 s? \_\_\_\_\_
7. Is the object accelerating at a constant rate? \_\_\_\_\_

Calculating Average Speed

Graph the following data on the grid below and answer the questions at the bottom of the page.  
SHOW WORK!

Time (sec)      Distance (m)

0	0
1	50
2	75
3	90
4	110
5	125

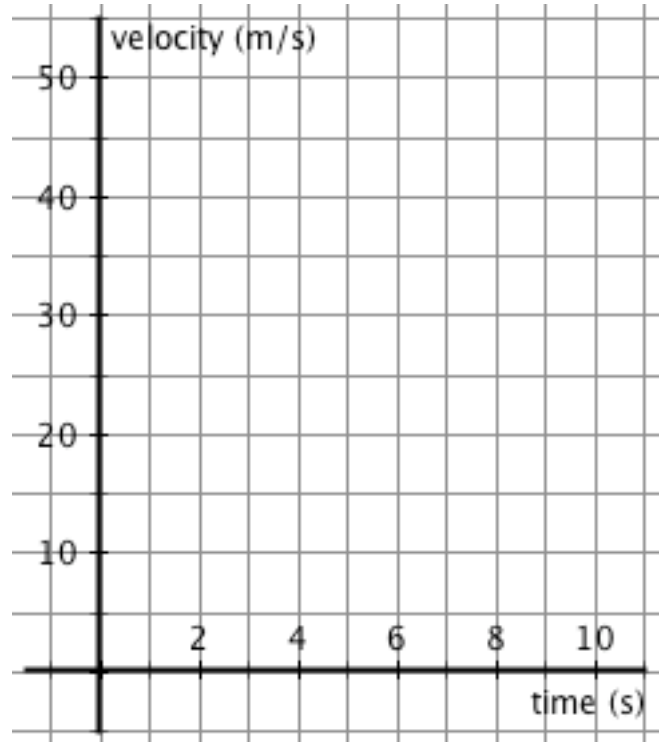


1. What is the average speed after two seconds?
2. After three seconds?
3. After 5 seconds?
4. What is the average speed between two and four minutes?
5. What is the average speed between four and five minutes?

Graphing Velocity vs Time

Plot the following data on the graph and answer the questions below. SHOW WORK IF APPLIES!

Time (s)	Speed (m/s)
0	0
2	11
4	21
6	30
8	39
10	49



- As time increases, what happens to the speed? \_\_\_\_\_
- What is the speed at 5 seconds? \_\_\_\_\_
- Assuming constant acceleration, what would be the speed at 14 seconds? \_\_\_\_\_
- At what time would the object reach a speed of 45 m/s? \_\_\_\_\_
- What is the object's acceleration? \_\_\_\_\_
- What would the shape of the graph be if a speed of 50 m/s is maintained from 10s to 20 s?
- Based on the information in Problem 6, calculate the acceleration from 10 s to 20 s.
- What would the shape of the graph be if the speed of the object decreased from 50 m/s at 20 s to 30 m/s at 40 s?