

# Distance vs. Time Graphs | MFM1P

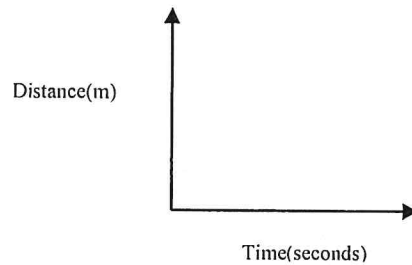
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## Calculated Base Ranger (CBR)

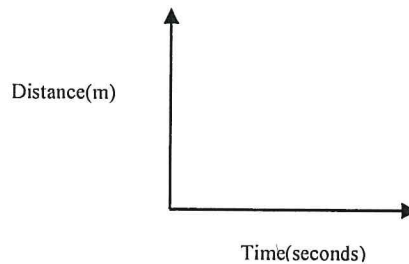
The CBR is a motion detector. It collects data and records the distance moved over a period of time. The information about the movement is represented by a distance-time graph.

1. What does the distance-time graph look like if:

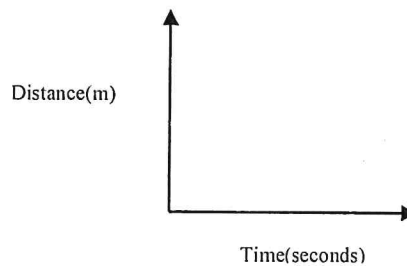
a) you are **not moving**?



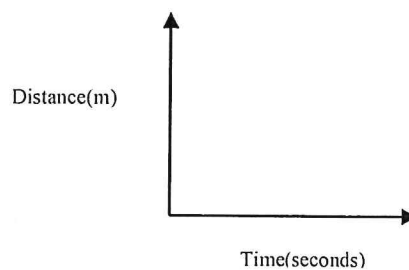
b) you are moving **away** from the CBR at a **constant rate**?



c) you are moving **towards** the CBR at a **constant rate**?

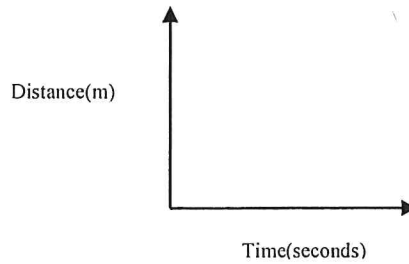


2. What would the distance-time graphs compare to one another if you were travelling **slower** or **faster**?

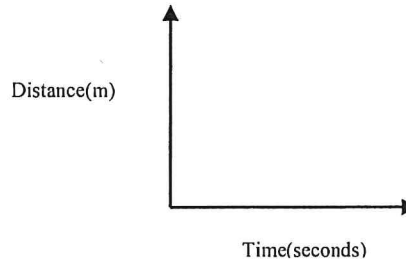


3. What do you think the graphs for the following scenerios would look like?

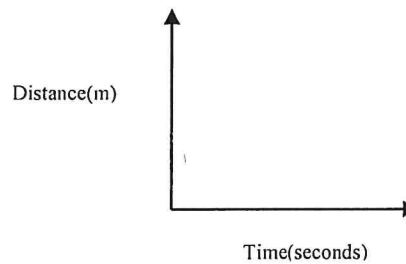
- a) Start at CBR. Walk away at steady pace for 5 seconds. Stop for 5 seconds. Continue to walk away from CBR at a steady pace for 5 seconds.



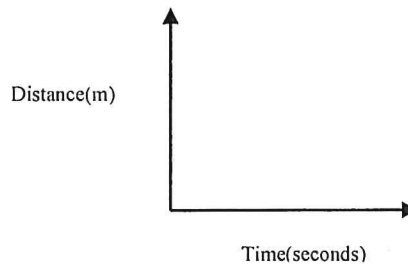
- b) Start away from CBR. Stand still for 5 seconds. Walk towards the CBR at a steady pace.



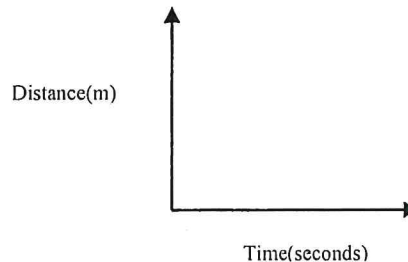
- c) Start away from the CBR. Walk quickly towards the CBR for 3 seconds and then stop just before you reach the CBR for the rest of the time.



- d) Start walking away from CBR slowly for 5 seconds. Continue to walk away from the CBR but at a fast rate.



- e) Start at CBR. Walk away quickly for 3 seconds. Stop for 3 seconds. Walk towards the CBR slowly.



# Distance vs. Time Graphs | MFM1P

John walked in front of a CBR for 6 seconds. The given distance-time graph was recorded.

Answer the questions below:

a) How far was he away from the CBR at the start?

b) What is his speed during the second line segment?

$$\text{speed} = \frac{\text{distance}}{\text{time}}$$

c) How long did he stop for in the middle of his walk?

d) Highlight the line segment where he travelling the fastest? How do you know?

e) What was his fastest speed?

$$\text{speed} = \frac{\text{distance}}{\text{time}}$$

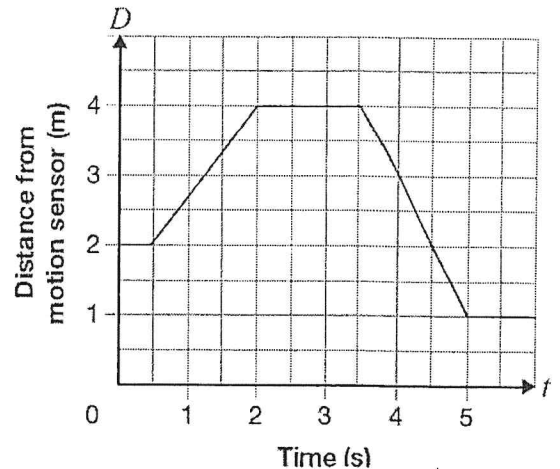
f) What distance was he away from the CBR at 4.5 seconds?

g) At what time was he 3 m away from the CBR?

h) What was the total time that he stopped for during the 6 seconds?

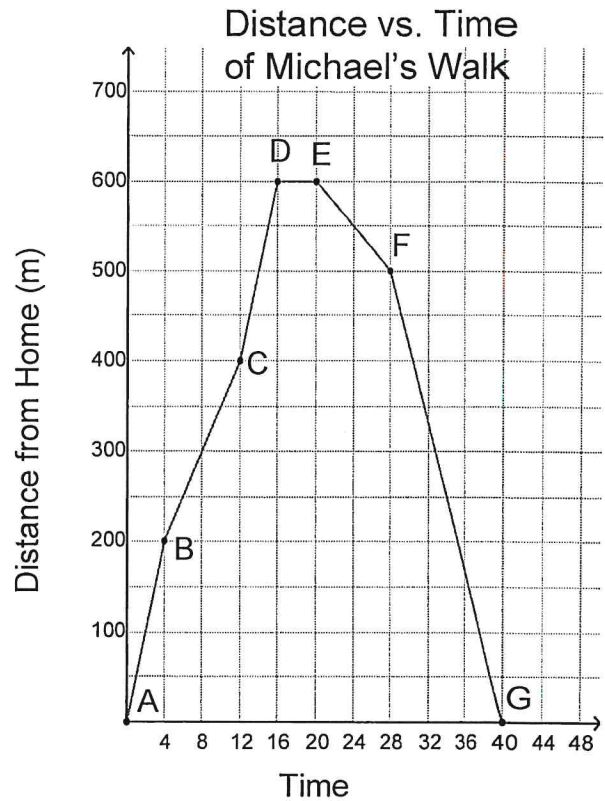
i) How can you tell whether he is moving away from the CBR or towards it?

Distance from Motion Sensor vs. Time





At 11 o'clock, Michael's mother sends him to the corner store for milk and tells him to be back in 30 minutes. Examine the distance-time graph given and answer the questions below.



1. Fill in the table for each of the line segments:

	AB	BC	CD	DE	EF	FG
<b>Direction</b> (away or towards home)						
<b>Time</b> (min)						
<b>Distance</b> (m)						
<b>Speed</b> (m/min)						

2. Indicate the intervals where Michael is travelling:

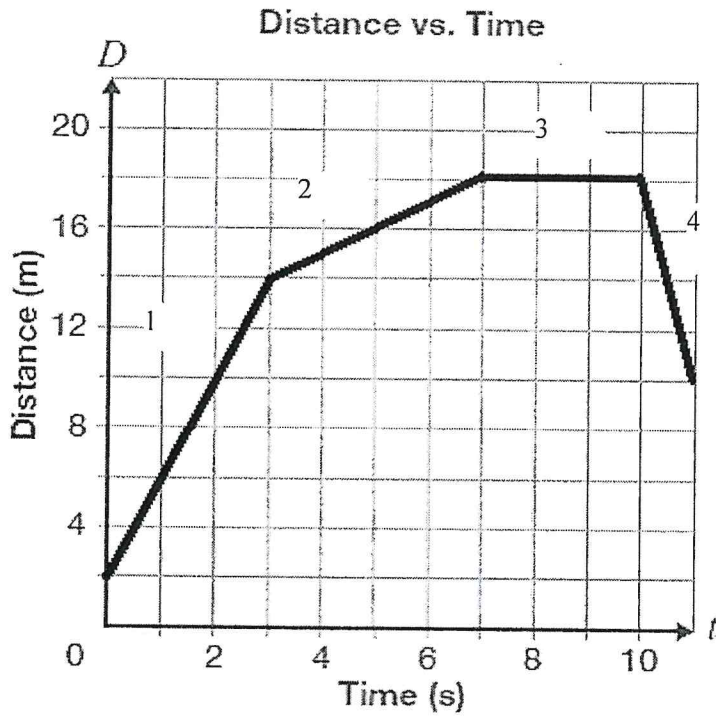
a) the fastest?

b) the slowest?

3. Explain why some line segments on the graph are steeper than others?
4. How long did it take Michael to reach the store? How do you know?
5. How far is the store away from home?
6. How long did Michael stay at the store?
7. How long did it take Michael to get home from the store?
8. How can you use the lines on the graph to tell which direction Michael is travelling?
9. Did Michael make it home in 30 minutes? How do you know?

## Practice: Distance-Time Graph | MFM 1P

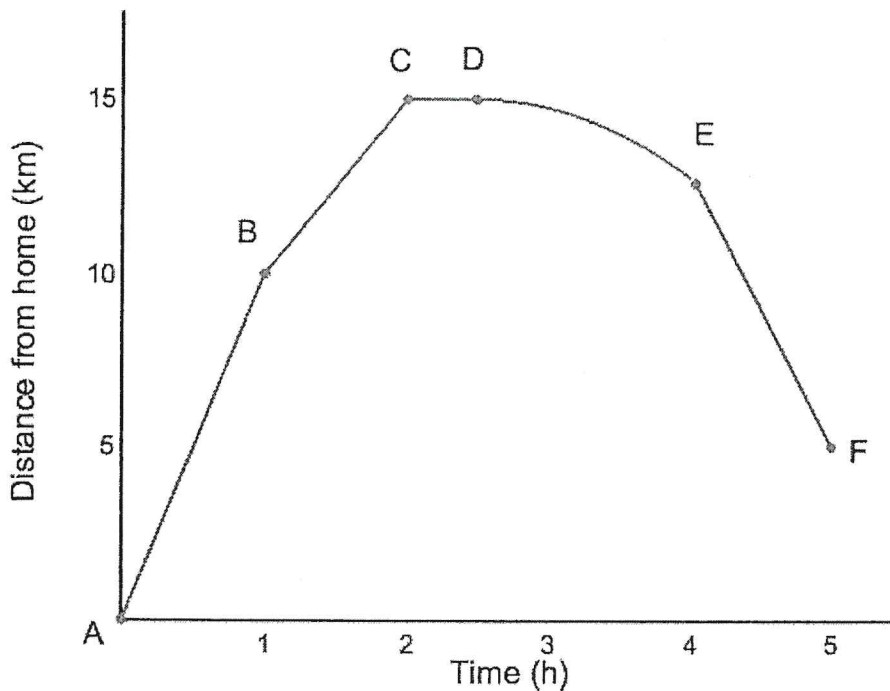
Anne's movements after she left her house are shown on this distance-time graph. **DESCRIBE** her movements for each leg by filling in the chart below.



	1	2	3	4
Direction				
Time				
Distance				
Speed				

## Practice: Distance-Time Graphs | MFM1P

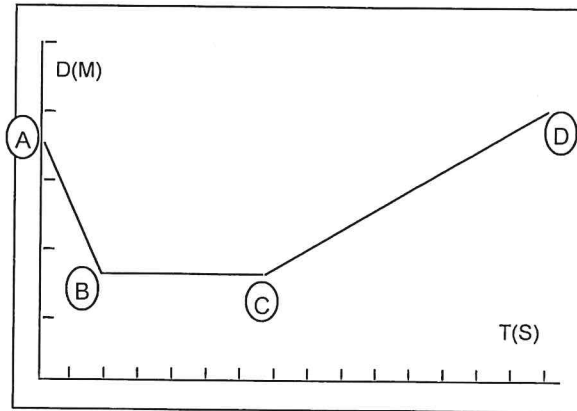
1. Devin went for a bicycle ride. The graph below shows his trip.  
**Note:** Distance is the number of kilometres from home.



- a) Calculate his speed during the first hour (AB) and the second hour (BC). Show your work.
- b) How does the speed between A and B compare with the speed between B and C?
- c) Explain what segment CD tells you about Devin's motion.
- d) Which section of the graph shows that Devin was changing speeds? Explain.
- e) What information can you determine from segment EF?



Take a look at the following graph made by Taz.



Refer to the section of the graph labeled from (A) to (B)

1. Approximately how far away from the CBR was Taz when he started (A) ? \_\_\_\_\_
2. Was Taz moving away or towards the CBR? \_\_\_\_\_ fast/slow? \_\_\_\_\_  
How far away was he at (B)? \_\_\_\_\_ How far did he move between (A) and (B) ? \_\_\_\_\_
3. How long did it take him to get from (A) to (B)? \_\_\_\_\_
4. Recall that speed = distance  $\div$  time. Calculate Taz's speed from (A) to (B) \_\_\_\_\_

Refer to the section of the graph labeled from (B) to (C)

5. How far away was Taz at (B)? \_\_\_\_\_ How far away was Taz at (C)? \_\_\_\_\_
6. What was Taz doing from (B) to (C)? \_\_\_\_\_
7. How long was he doing this for? \_\_\_\_\_

Refer to the section of the graph labeled from (C) to (D)

8. Approximately how far away from the CBR was Taz when he started (C) ? \_\_\_\_\_
9. Was Taz moving away or towards the CBR? \_\_\_\_\_ fast/slow? \_\_\_\_\_
10. How far away was he at (D)? \_\_\_\_\_ How far did he move between (C) and (D) ? \_\_\_\_\_
11. How long did it take him to get from (C) to (D)? \_\_\_\_\_
12. Recall that speed = distance  $\div$  time. Calculate Taz's speed from (C) to (D) \_\_\_\_\_

## Practice: Distance – Time Graphs | MFM1P

Below is a graph of Peter walking to his friend Steve's house. He takes a break along the way.

a) How long did it take Peter to reach Steve's house?

b) For how long was Peter stopped?

c) (i) How fast was Peter travelling during the first part of his walk?

(ii) How fast was Peter walking after his break?

d) Discuss the meaning of the ordered pair (5,750).

e) If Peter wanted to reach Steve's house 2 minutes earlier, what would his speed need to be after his stop? Illustrate this on the graph.

