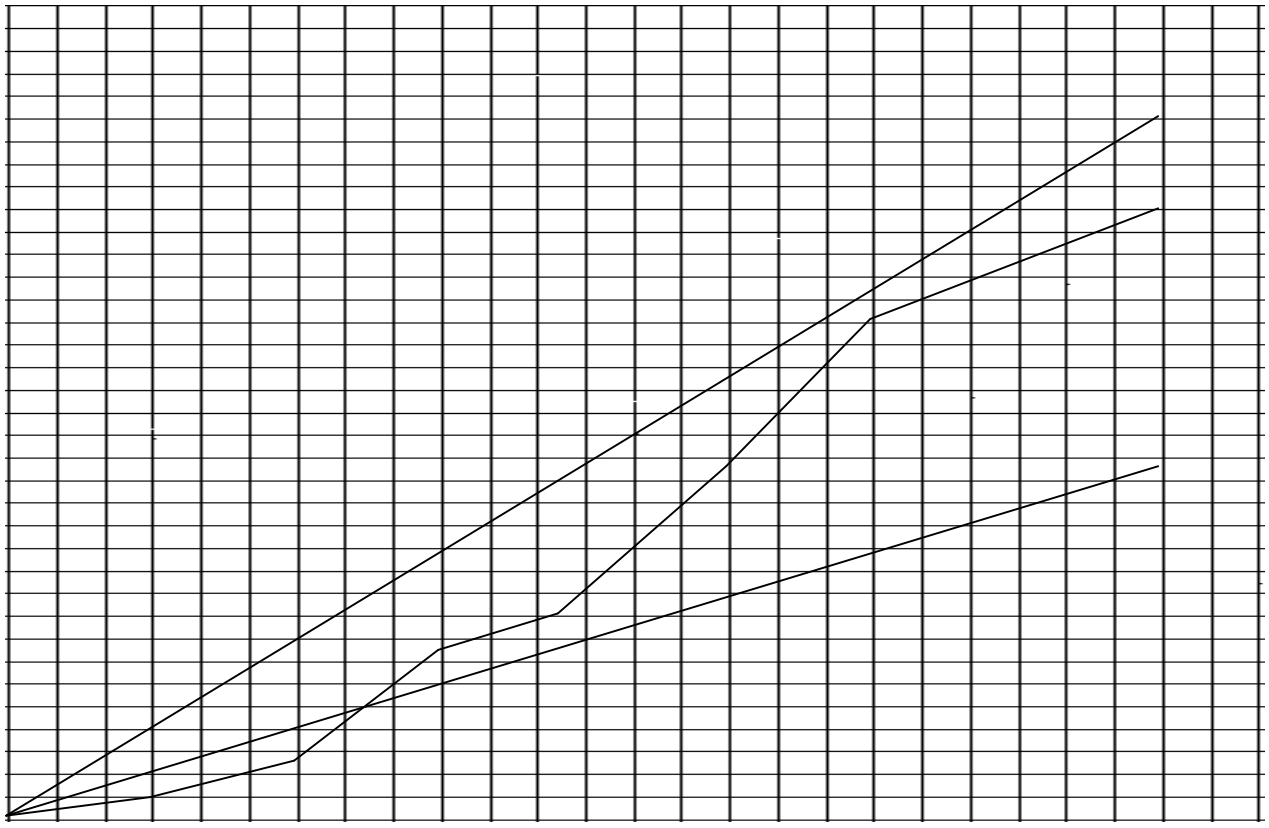
NAME_***Answers***___ DATE___
PERIOD____ MOTION I

Ideas: Speed is a rate, a ratio of change in position
Speed = Change in Distance divided by Change in Time
S=D/T is the same as Speed is time into distance.
Average Speed is Total Change in Distance divided by Change in Time
Velocity is Speed with a direction (+ is one way, - the other way)
Acceleration is Change in Velocity divided by Change in Time.

On a distance time graph, slope is velocity. On a speed time graph, slope is acceleration.

1. Use the data in this table to draw three distance time graphs on a piece of graph paper. Mark time units along the bottom and mark distance units along the side of the paper. Use a different color pen or kind of line for each car.

TIME (seconds)	TOTAL DISTANCE (Meters) CAR A	CAR B	CAR C
0	0	0	0
1	4	1	2
2	8	3	4
3	12	8	6
4	16	10	8
5	20	16	10
6	24	22	12
7	28	24	14
8	32	26	16



Now, answer these questions:
2. Which line has the steepest slope? What does this tell you about the speed of the car?
Car A has the steepest slope, it is going the fastest (greatest average speed)

3. Which car did not travel at a constant speed? How do you know? How does a line showing constant speed compare with a line showing changing speed?
Car B is not going a constant speed, its slope is changing, it is a non-straight line.

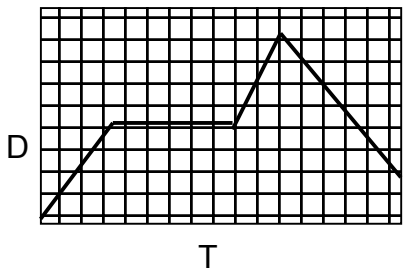
4. What is the average speed of each car?
Car A has an average speed of Vavg=D/T = 32 m/8 s = 4 m/s
Car B has an average speed of Vavg=D/T = 26 m/8 s = 3.25 m/s
Car C has an average speed of Vavg=D/T = 16 m/8 s = 2 m/s

5. What would the average speed of a car be that had a straight, level, horizontal (no slope) line on a graph?
No slope is 0, so that is 0 m/s, or the object is stopped.

6. Explain why it would be impossible to see a distance-time graph with a straight up and down line (vertical slope):
This means going infinite distance (impossible) in no time… Infinite slope, or speed!
It is also impossible for the line to to the left… meaning going backwards in time!

7. A car goes 30 kilometers in the first 30 minutes of a trip and then 50 more kilometers in the next 30 minutes. Find the car's average speed for the trip.
Total dis is 30 km + 50 km = 80 km
Total time is 30 min + 30 min = 60 min
Vavg=D/T = 80 km/ 60 min = 1.333 km/min or 80 km/hr !

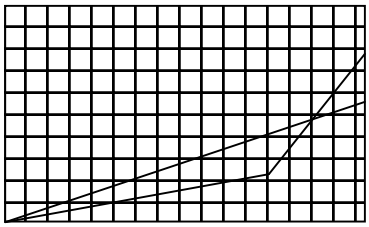
8. A Car starts out on a trip down a long straight road. As it travels, it can move at a steady speed, speed up, slow down, or even stop. The distance time-graph for the car's trip is shown. Using the graph, describe the changes in motion that occurred during the car's trip.
Car goes at a slow steady speed forward, then is stopped, then goes quickly steadily forward, then goes at a constant speed backwards…



9. Shown in this picture are distance-time lines for two ships during part of their voyage. Which ship has the greater speed at time = 2 hours? How can you tell?

Car A is going faster after 2 hours, a Greater distance in the same time…

DISTANCE



TIME 0 1 2 3 4 5

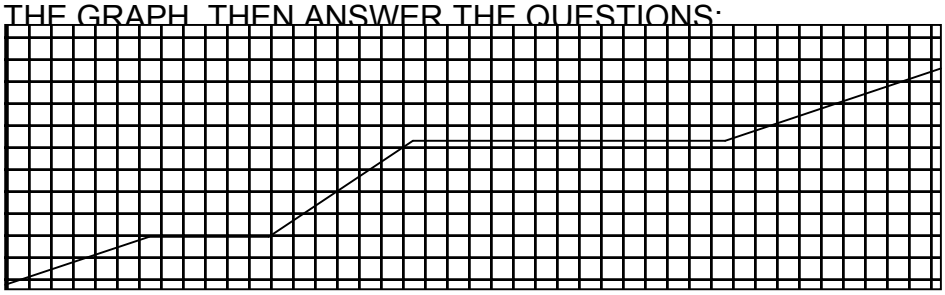
9.5 Over the time up to time = 5 hours, how do the average speeds of the two ships compare? ***Car B has a greater average speed, because at the end he had gone a farther distance in the same time.***

10. LOOK AT THE GRAPH, THEN ANSWER THE QUESTIONS:

DISTANCE (km)

6

0



12pm 1pm 2 pm 3pm 4 pm 5pm

10.1 In the first hour of the hike, what is the hikers speed?

a) 1 km/hr ***b) 2 km/hr*** c) 3 km/hr d) 10 km/hr

10.2 What is the hiker's average speed during the first two hours of the hike?

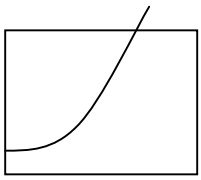
a) 2 km/hr b) 2.5 km/hr ***c) 4 km/hr*** d) 5.5 km/hr

10.3 What is the hiker's speed for the entire hike?

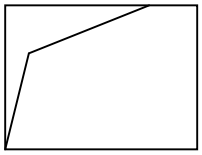
a) 1 km/hr ***b) 2 km/hr*** c) 5 km/hr d) 10 km/hr

11 Match the correct distance-time graph with the car it represents

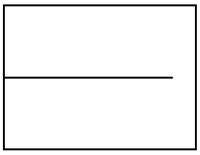
__***4***__A car that goes slow, then speeds up.
__***3***__A car that is stuck in a ditch
_***5***___A car that goes at a constant speed
__***2***__A car that goes fast, then slows down
_***6***___A car that goes backwards.
_***1***___A car that steadily increases speed.



Time



Time



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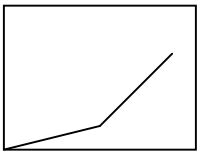

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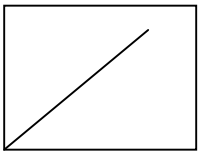
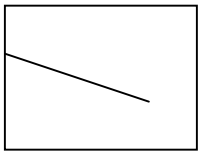
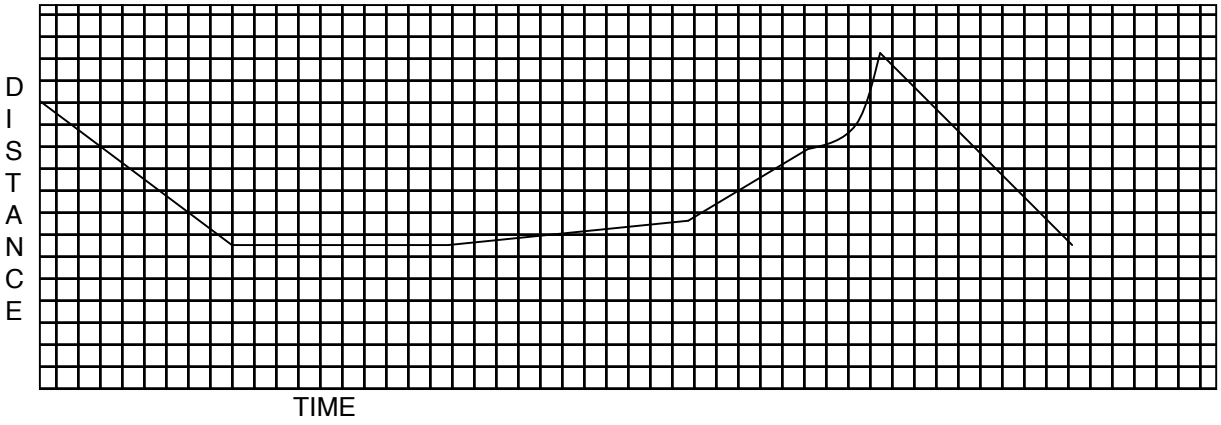


Time



Time

12 Draw a rough idea of what a distance-time graph would look like for an object that: starts off away from the starting line, goes steadily backwards for awhile, then stays perfectly still, then goes slowly steadily forward, then goes quickly steadily forward, then accelerates forward, then travels backwards to the starting line:



Match each description with the correct graph and table:

1) A car stationary at point P	GRAPH__***c***_____	TABLE___***8***_____
2) A car stationary at a distance away from point P	GRAPH___***d***____	TABLE___***4***_____
3) A car moving away from point P at constant speed	GRAPH___***h***____	TABLE___***7***_____
4) A car slowing down and moving away from P	GRAPH___***b***____	TABLE___***5***_____
5) A car increasing speed and moving away from P	GRAPH___***a***____	TABLE___***6***_____
6) A car moving towards P at a constant speed	GRAPH___***e***____	TABLE___***3***_____
7) A car slowing down as it approaches P	GRAPH___***f***____	TABLE___***1***_____
8) A vehicle increasing in speed as it approaches P	GRAPH___***g***____	TABLE___***2***_____

D	T
600	10
555	11
520	12
495	13
480	14

1.

D	T
600	10
585	11
560	12
525	13
480	14

2.

D	T
600	10
570	11
540	12
510	13
480	14

3.

D	T
100	10
100	11
100	12
100	13
100	14

4

D	T
600	10
645	11
680	12
705	13
720	14

5.

D	T
600	10
615	11
640	12
675	13
720	14

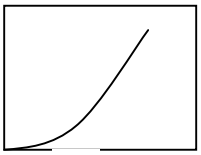
6.

D	T
600	10
630	11
660	12
690	13
720	14

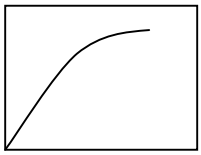
7.

D	T
0	10
0	11
0	12
0	13
0	14

8.

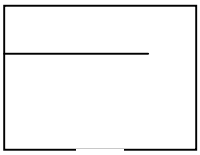


a

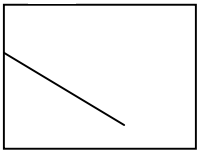


b

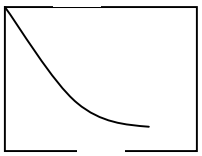
c



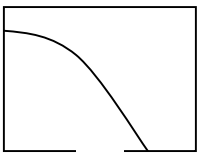
d



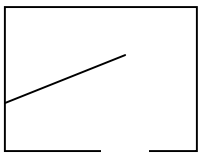
e



f



g



h

Distance across the y, time across the x